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SEE PAGE 329

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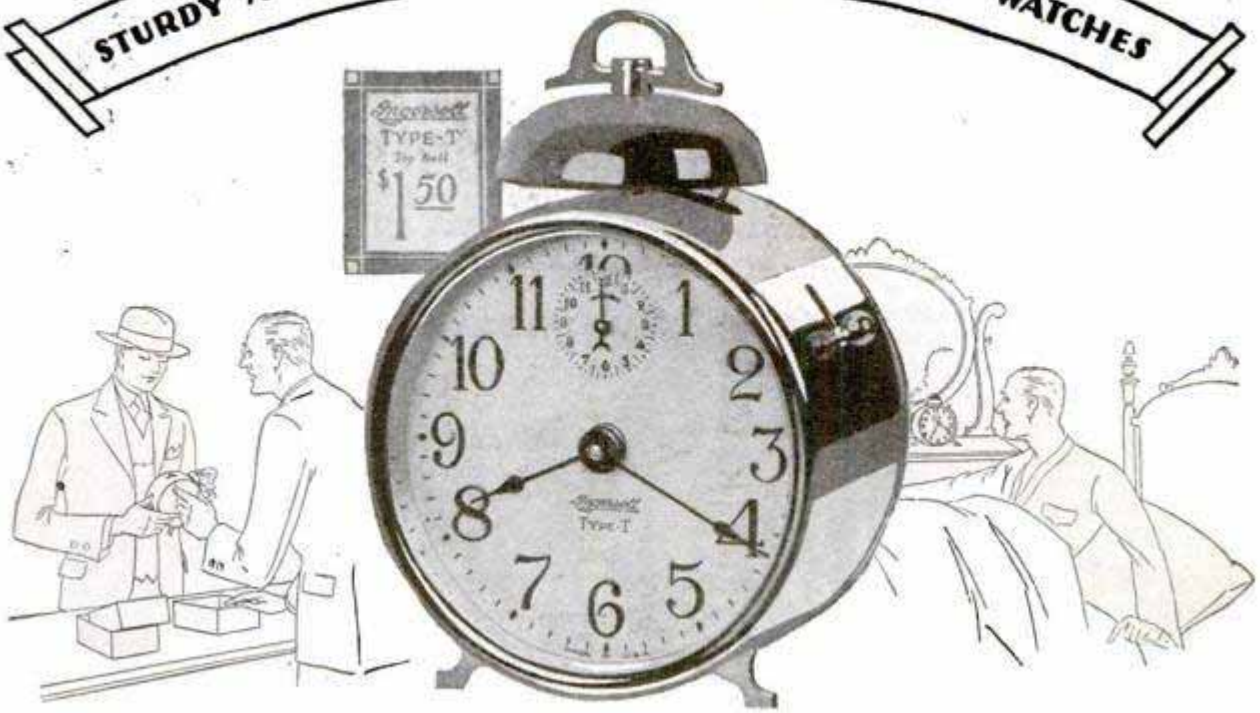

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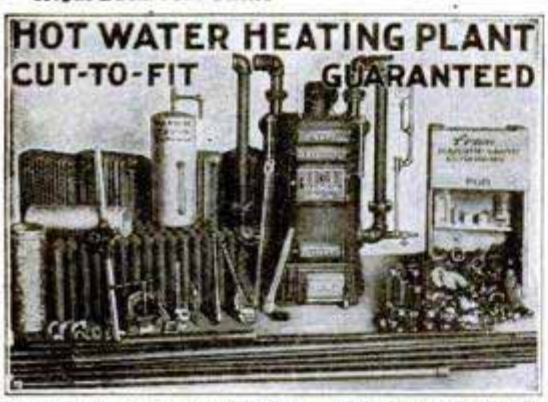

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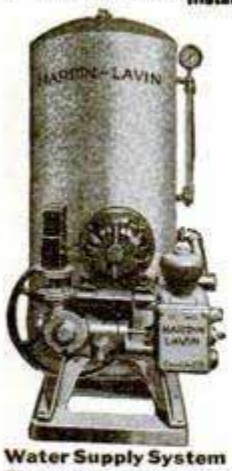

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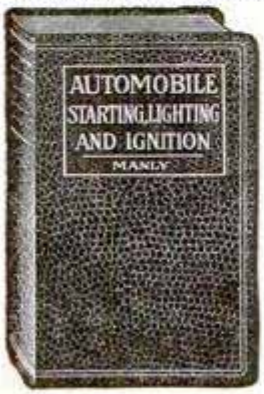

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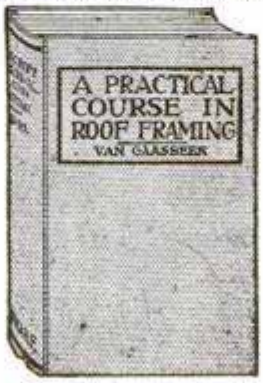

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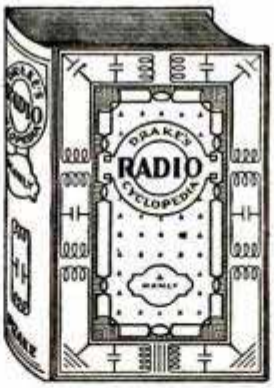

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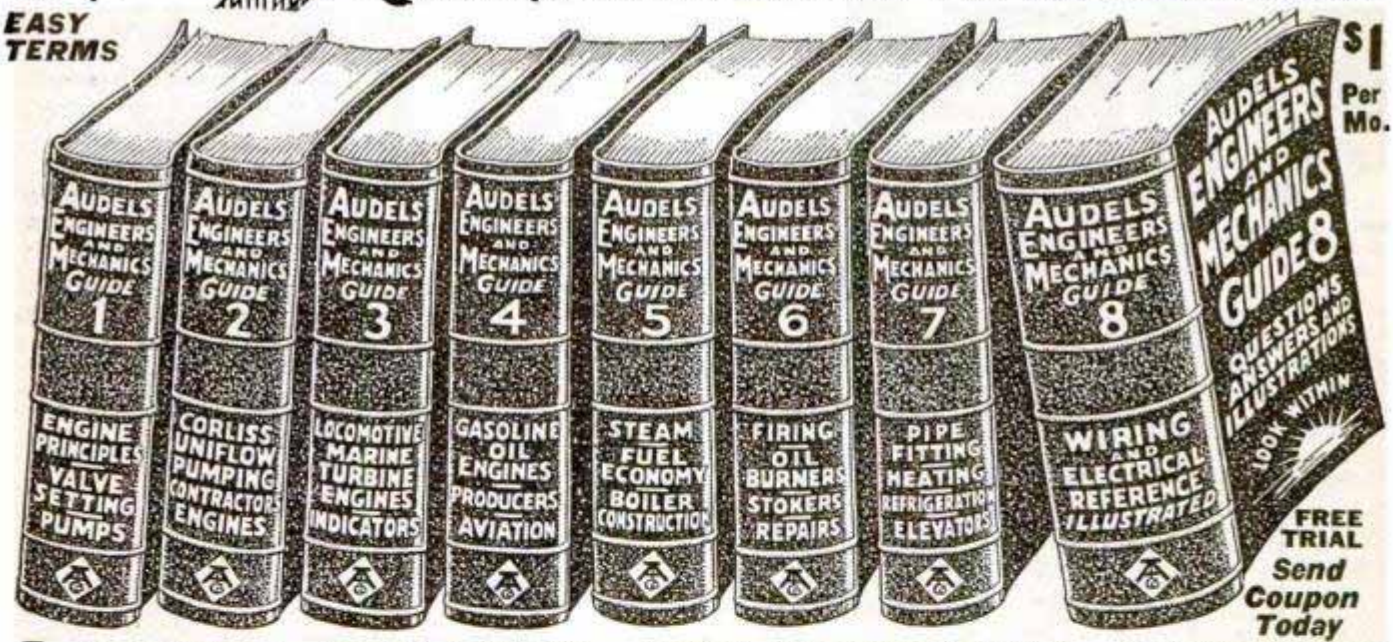

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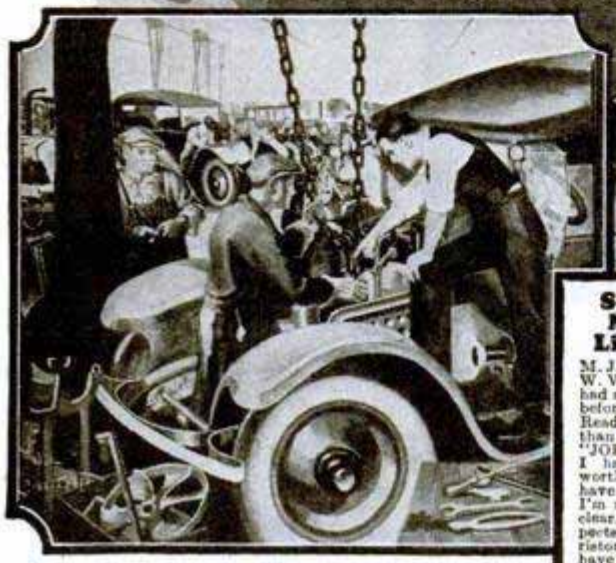

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M. J. Morriston, Parkersburg, W. Va. (photo at right), never had a day's experience on cars before starting my training. Read what he says when less than half-way through his "JOB-WAY" course. "What I have already learned is worth over $500 to me. I have gone into business and I'm making over $60 a week clear, with wonderful prospects." And what Mr. Morriston and hundreds of others have done I will help you to do!

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4 repair & testing OUTFITS INCLUDED

The World's biggest, most fascinating business needs you!

You needn't slave away at small wages another minute—mail coupon and I'll tell you how I train you at home in your spare time for positions paying up to $150 a week. Unlimited opportunities for trained Electrical and Mechanical Auto Experts. Let me show you how my "JOB-WAY" training has prepared hundreds of men just like yourself for a quick, brilliant success in the Auto business.

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Don't sell your time for low pay! You don't need to when you have my "JOB-WAY" training. As Directing Engineer of this Institution I know what training you need to succeed, AND I GIVE YOU THAT TRAINING right in your own home. MASTER every branch of Auto, Truck and Tractor work. I train you with JOBS—not books. I bring the original "JOB-WAY" training TO YOUR HOME!

No Other "JOB-WAY" Training!

My training includes ALL Electrical work—Ignition, Starting, Lighting—ALL Mechanical end, Welding, Brazing, Vulcanizing—also Business Course—also Monthly Magazine, also 4 Testing and Repair Outfits. Nowhere else I know of, can get you ALL this.

Six Billion dollars spent each year to repair 18 Million Autos, Trucks, Tractors—it's the world's biggest business. Amazing money opportunities everywhere for trained men. My Employment Service helps you to big jobs, and I help you to get into business for yourself.

Tools and Test Bench Equipment Included

I supply every Cooke JOB-WAY student with 4 big, complete, costly outfits absolutely free of extra cost! Many students use these outfits to make money shortly after starting my training. Mail coupon for this remarkable offer!

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Ten agreements in my big free Auto book. No. 1 is "I will refund every cent of your money if after receiving my training you are not absolutely satisfied." This and nine other wonderful agreements make my "JOB-WAY" course the training for you! Be sure to get my book and read all ten agreements.

Experience, Education Not Needed!

I don't care how little schooling you have, I will train you to become an Auto Mechanic or refund your money! Boys and men of all ages have become Garage owners and managers, Superintendents, Foremen, Auto Experts, BIG PAY executives, after completing Cooke "JOB-WAY" training, I prove to you that I will prepare you to take advantage of the many wonderful opportunities of the great auto business!

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I will send it to you without one penny of cost. Read all the facts, find out about the demand for trained Auto Experts. Let me tell you how easily and quickly you, too, may become an Auto Expert. Splendid offer right now to ambitious men. Coupon brings complete information. Mail it today!

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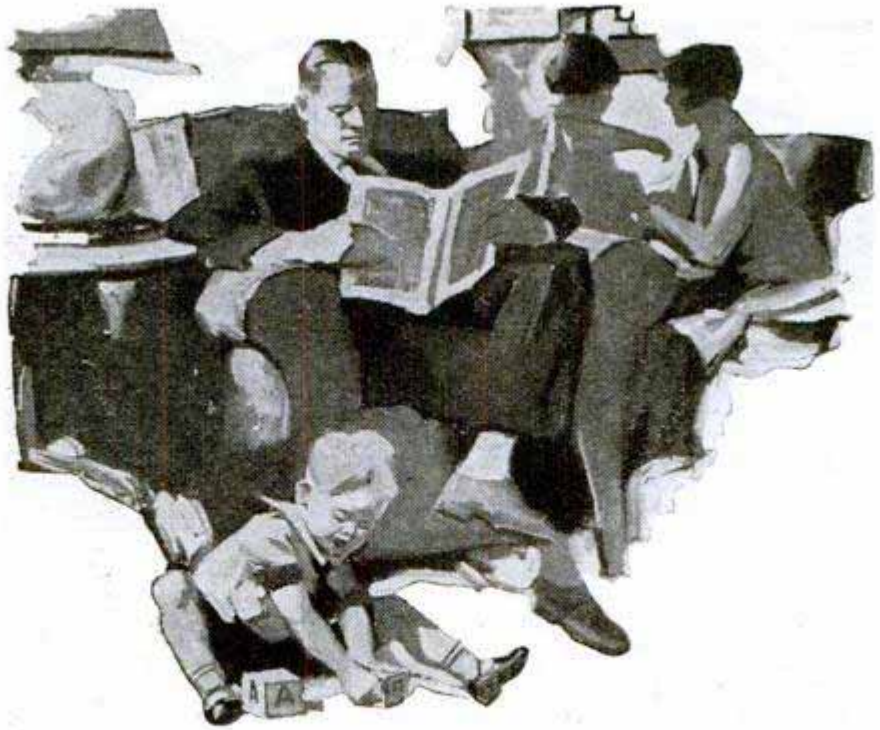

Job Insurance

YOU'VE insured your home, your car, yourself. Have you ever thought of insuring your job?

You feel perfectly safe in your present employment—but are you? Remember that business inevitably goes through alternate periods of expansion and contraction. Some time the pendulum will start on the downward swing. How far will it go? Who can tell?

Right now, you may be in a precarious position. Are you absolutely certain you would be retained if dull times struck your particular business? You've seen other men laid off during slack periods—you felt sorry for them. Can you be sure that your wife and children will not suffer because of your unemployment?

Of course you can! You've noticed that the more capable men are always retained when a cut is necessary. Therefore, why not make yourself a better workman than your fellows? You want a higher position some day—but you ought first to make your present place secure. Building for the future will be safer and easier because of it.

Job insurance of this type is unfailing and inexpensive. A great institution—The International Correspondence Schools—has been offering it since 1891. In that time, more than 3,500,000 people have literally taken out policies to hold old jobs and win new ones.

A short, elementary course, that will help to insure your job, costs surprisingly little—for the confidence and security that it gives. With a strengthened position and increased salary, you can enter upon advanced courses that will give you the training to go correspondingly further. It is a simple, cumulative process and the possibilities are limitless.

In this "Universal University," you may study at home in your spare time—while your work goes on without interruption.

Do you care enough about your job to insure it against misfortune? The coupon will help you —without obligation to yourself.

Mail the coupon for Descriptive Booklet

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Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the course before which I have marked X in the list below:

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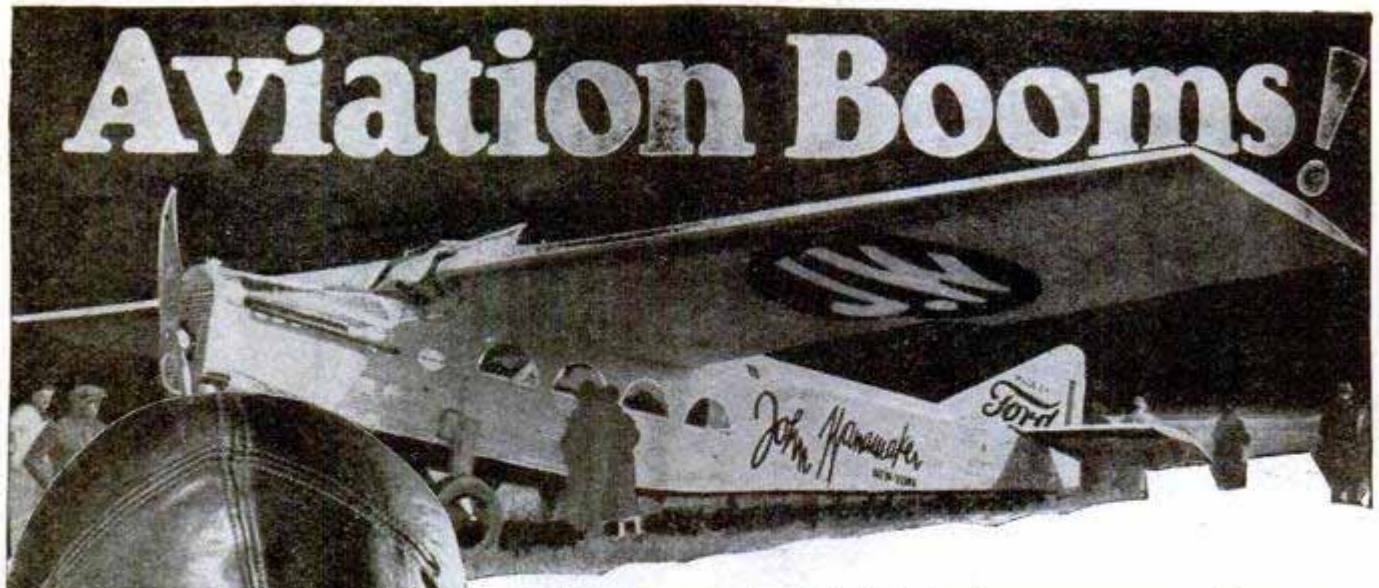
Aviation Booms!



The skies are dotted with daring young men—from every country come stories of new feats—new victories—new heroes! And now Aviation, with all its Fascinating Adventure, calls for red-blooded young men—and will pay them splendid salaries! Read how some of Aviation's Pioneers will help you to qualify to get into Aviation—then send today for your copy of our FREE Illustrated Booklet, listing and describing the opportunities that await you.

If You Want Thrills-Popularity-Big Pay

LEARN AVIATION *QUICK!*

ARE you a red-blooded, daring he-man? Are you eager for a life of constant thrills, constant excitement and fascinating events? Do you crave adventure, popularity, admiration, and the applause of great crowds? Then why not get into the Aviation Industry—the greatest adventure since time began—the greatest thrill ever offered to man?

Think what Aviation offers you. Thrills such as you never had before! The praise and plaudits of the multitude. And a chance to get in on the ground floor where rewards may be unlimited!

Everything is set for one of the greatest booms in history. Big fortunes came out of the automobile industry and out of motion pictures. **Big** fortunes will also come out of Aviation! The development of Aviation as an industry is bringing with it a call for trained men. Those who qualify quickly should find themselves on the road to undreamed of money—success—popularity—and prominence!

full of interest—and so absorbing that you actually forget you are studying. But best of all are the ultimate rewards you are fitting yourself to gain!

PICK YOUR JOB!

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Airplane Instructor
Airplane Engineer
Airplane Repairman
Airplane Assembler
Airplane Mechanician
Airplane Inspector
Airplane Builder
Airplane Salesman
Exhibition Manager
Airplane Contractor
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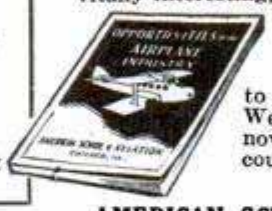
Send for FREE Book

Send the coupon for our new, free booklet, *Opportunities in the Airplane Industry.* It is vitally interesting, reads like a romance and tells you things about this astonishing profession you probably never even dreamed of. You owe it to yourself at least to read it. We offer you a free copy now, no obligation. Mail the coupon for yours today.



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Easy to Become An Aviation Expert

Get into this thrilling business at once while the field is new and uncrowded. Now—by a unique new plan—you can quickly secure the preliminary training necessary to get a start in the Aviation Industry, either flying or ground work, at home during your spare time. Experts will teach you the secrets—give you the inside facts that are essential to your success. And, the study of Aviation by our method is almost as fascinating as the actual work itself. Every lesson is chock-

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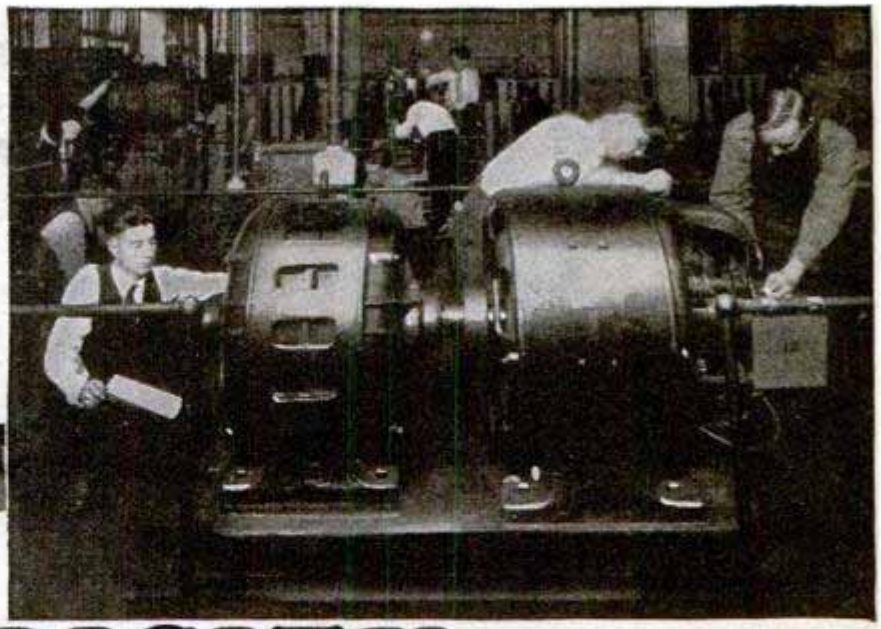

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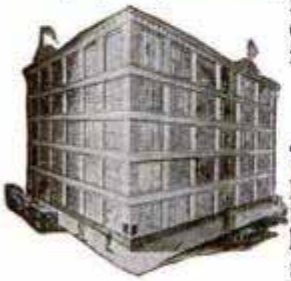
Why work at dull, uninteresting jobs that will never pay you more than $25, or perhaps $30 a week? Make up your mind *now* to become a practical electrician! Train in 12 easy weeks to hold down the kind of a job that leads to salaries of $50, $60 a week and up. Open up your own electrical shop and become independent.

Learn by Doing

Electricity, as taught in the Great Shops of Coyne, is surprisingly easy to grasp. That's because you learn by doing on actual electrical machinery—finest outlay in the country. You learn by *doing*—and you learn from the ground up.

Not a Correspondence School

Instructors work right along with you every step of the way. You get personal attention—you are trained, not by reading, but on electrical machinery. The **Coyne Way** gives you real, *sound* knowledge that fits you to do *practical* electrical work in all its branches.



Now In Our New Home

This is our new, fireproof, modern home wherein is installed thousands of dollars' worth of the newest and most modern Electrical Equipment of all kinds. We now have a larger amount of floor space devoted to the exclusive teaching of practical electricity. Every comfort and convenience has been arranged to make you happy and contented during your training.

Prepare for Jobs like these

Here are a few of hundreds of positions open to Coyne-trained men. Our free employment bureau gives you lifetime employment service.

- Armature Expert $50 a Week and up
- Substation Operator $65 a Week
- Auto Electrician $60 a Week and up
- Inventor - Unlimited
- Maintenance Engineer $60 a Week and up
- Service Station Owner $60 a Week and up
- Radio Expert $60 a Week and up

No Experience or Advanced Education Needed

You don't need one day's previous electrical experience or more than a common school education to learn electricity the Coyne way. Some of our most successful graduates never went farther than the 8th grade.

Earn While You Learn

By special arrangement, our employment department helps many students locate part-time work, if they want to earn while they learn. And after graduation we give them the benefit of our FREE EMPLOYMENT Service for Life. Every week we help secure positions for Coyne men.

Get FREE Book

Write today for my big 56-page book on electricity with over 150 photographs. Learn what great opportunity Coyne Training opens up for you. Get the facts all about jobs, salaries, your future. Act Now!

COYNE Electrical School

H. C. Lewis, Pres. — Est. 1899

500 S. Paulina St., Dept. 28-72 Chicago, Ill.

Mr. H. C. Lewis, Pres.
COYNE ELECTRICAL SCHOOL, Dept. 28-72
500 S. Paulina St., Chicago, Ill.

Dear Mr. Lewis: Without obligation send me your big free catalog and all details of Free Employment Service, Radio, and Automotive Electrical Courses that are included and how many "earn while learning." I understand I will not be bothered by any salesman.

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City _____ *State* _____

BIG MONEY IS YOURS

As An Expert Auto Painter!

BE THE BOSS

20,000,000 Cars Need Painting

Do you want to make big money **quickly** and **easily?** Can you recognize the big chance when it is presented to you? Well, here it is. Here's your great opportunity to get into the last **uncrowded, big pay** business. It's your chance to learn a new business that you can get into on your own hook—your chance to be the boss and work when and for as long as you please. **Don't miss this amazing new, golden opportunity!**

Good Jobs Everywhere

Here are the facts! Today there are twenty-five million autos on the streets and roads of America. When you walk down the street, just count the numbers of passing autos that need re-painting. The result will astound you! For twenty out of every twenty-five cars in use today **need a new paint job!** Then, consider this fact. Manufacturers are turning out new cars at the rate of three million yearly, and out of every twenty-five cars leaving the factory today, **twenty will need re-painting fourteen months from today.** Think of it!

$5,000 a Year for YOU!

Do these facts spell o-p-p-o-r-t-u-n-i-t-y to you? I'll say they do! Why? Simply because there aren't enough trained auto painters to go around. Dealers report a tremendous scarcity of really skilled men. Manufacturers, too, say they cannot find enough good auto painters to meet their requirements. And what happens? Why, everyone is willing to pay the limit to get trained men. You can cash in on this overwhelming demand—**and make big money!** C. I. Wescott of Detroit says, "My first week's pay check was $78.80 and it's going to be more this week."

No Experience Needed

Regardless of how old you are, or what your experience or education has been, I will have you ready to take a position and make a big salary in **just a few short months!** That's my promise to you! After you complete my marvelous training, you can hold down a good, steady position or own your own shop making up to $100 a week! I can prove it! If you can't do it—why **I'll refund every red penny of your money.** What could be fairer than that?

GET THE PROOF FREE

G. King Franklin, Supt.,
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Dept. 1101, 425 S. Ashland Ave., Chicago.

Send sample shop-tickets free and information on how I may learn auto painting and Duco at home in spare time.

Name _____

Street No. _____

City _____ State _____

YOUR OWN BUSINESS!

If you don't want to work for someone else, why you can start an auto painting business of your own. There's not a town in this country that cannot support a good shop. And it doesn't require a great deal of capital to start. You can begin with a small investment—turn your money quickly—and in less than a year you'll be earning more profits than you ever could earn working for someone else. I'll show you how you can start your own shop. I'll show you how you can succeed like Stanley Field. He says: "We are building a big addition to our shop and getting more work than we can handle." My consultation service keeps on for life—and costs you nothing.

G. King Franklin, Supt.

PROOF!

Chicago Duco says: "Skilled Duco men are scarce. We can place many at $1.00 to $1.25 an hour." Binks, one of the largest auto equipment manufacturers, says: "The big auto manufacturers are insisting that their dealers repaint all used cars." Stockton, Illinois, says: "No shop here. All work must go to Freeport. Believe plenty of work to make paying business." Nash says: "This is a big field and splendid opportunities for your graduates in repainting cars." Many, many more like these.

Easy to Learn!

It is easy to become an auto painter my way. My Shop Type Method—the greatest advance in home study training—enables you to learn quickly and easily. No car needed for practice. You simply paint on wood and metal panels. I give you thirteen big outfits without extra charge. I teach you everything—priming, surfacing, painting, ducoing, varnishing, striping—everything you need to know to hold down a big salaried position—**in a few short months!**

Learn at Home!

The beauty about my plan is that you can learn at home in your spare time—evenings—and keep on with your present job while you are learning this big-pay business. This is positively the greatest money-making chance you have ever had. And this wonderful training costs only a few cents a day! It's your chance to get into an uncrowded business that pays big profits. If you really want to forge ahead, get information now. Don't wait. Get my big illustrated booklet FREE—without any cost or obligation. Act quickly. Mail coupon today.

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AUTO

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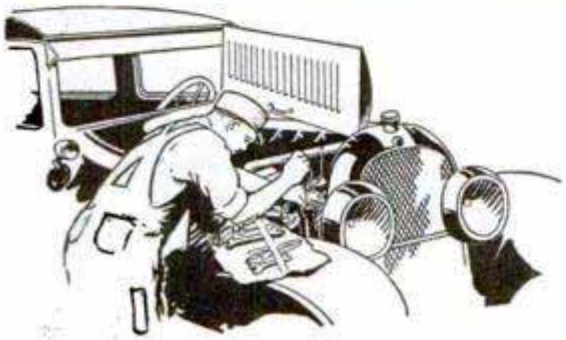

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Put the JIFFY INDEX to work for you!

Can You FIX IT?

Can you take out "play" in differential? Can you kill the "Shimmy" in steering? Can you reset TIMING? Can you put your finger on engine trouble without guessing or tinkering? Can you pull the starter off and fix it? Can you adjust and repair transmission, engine, rear axle, bearing?

These Books Tell How!

They bring the answer to any auto problem **instantly.** And they show the best, quick, professional way to do EVERY repair and replacement job you will ever need. Auto owners say the cost is saved over and over again by showing how to make adjustments and emergency repairs on the road.

5 Big De Luxe Volumes just off the press!

2400 pages, over 2000 illustrations, wiring diagrams, equipment charts, etc. De Luxe edition with gold-stamped flexible binding. Sent FREE for 15 days' use. If not wanted return express collect. If kept, send only $2 after 15 days, then $3 a month until special advertising price, $24.80, is paid.

A Year's Consulting Membership FREE!

Privilege of consulting engineers of million-dollar American Technical Society on any automotive problem for one year without charge, if you mail coupon immediately.

American Technical Society

Dept. A-219, Drexel Ave. & 58th St.,

CHICAGO, ILL.

The billion-dollar auto industry offers rich prizes to men with gumption enough to really learn all branches of automotive mechanics. A better job, bigger pay—a chance to go into business and get a share of the huge profits, are waiting for any man who even half tries to improve his ability to deliver service. And here's the shortest, easiest way: No tedious studying, no memorizing, no lessons or examinations. Just LOOK UP the fact you seek. You'll find the answer to any auto problem literally at your finger-tips, in the famous JIFFY INDEX. No need to "carry it in your head," at all.

"Was garage hand—now have Shop of my own," writes W. Sidle of Toboso, O.

J. H. Geise of Detroit says: "I received $50 worth of information out of them the first 5 days."

"I got a raise," says P. Ervin of Yarmouth, N. S., shortly after getting his books.

And D. S. Reid of Siluria, Ala., was offered $4000 for invention worked out with these Auto Books.

Dont Send a Penny!

AMERICAN TECHNICAL SOCIETY,
Dept. A-219, Drexel Ave. and 58th St., Chicago, Ill.

I would like to see the new 5-volume edition of your AUTO BOOKS, but without obligating me to buy them. I will pay the few cents delivery charges only, but if I choose to, I will return them express collect and owe you nothing. If after 15 days' use I prefer to keep them, I will send you $2 and pay the balance at the rate of only $3 a month, until $24.80 is paid. Please include free membership.

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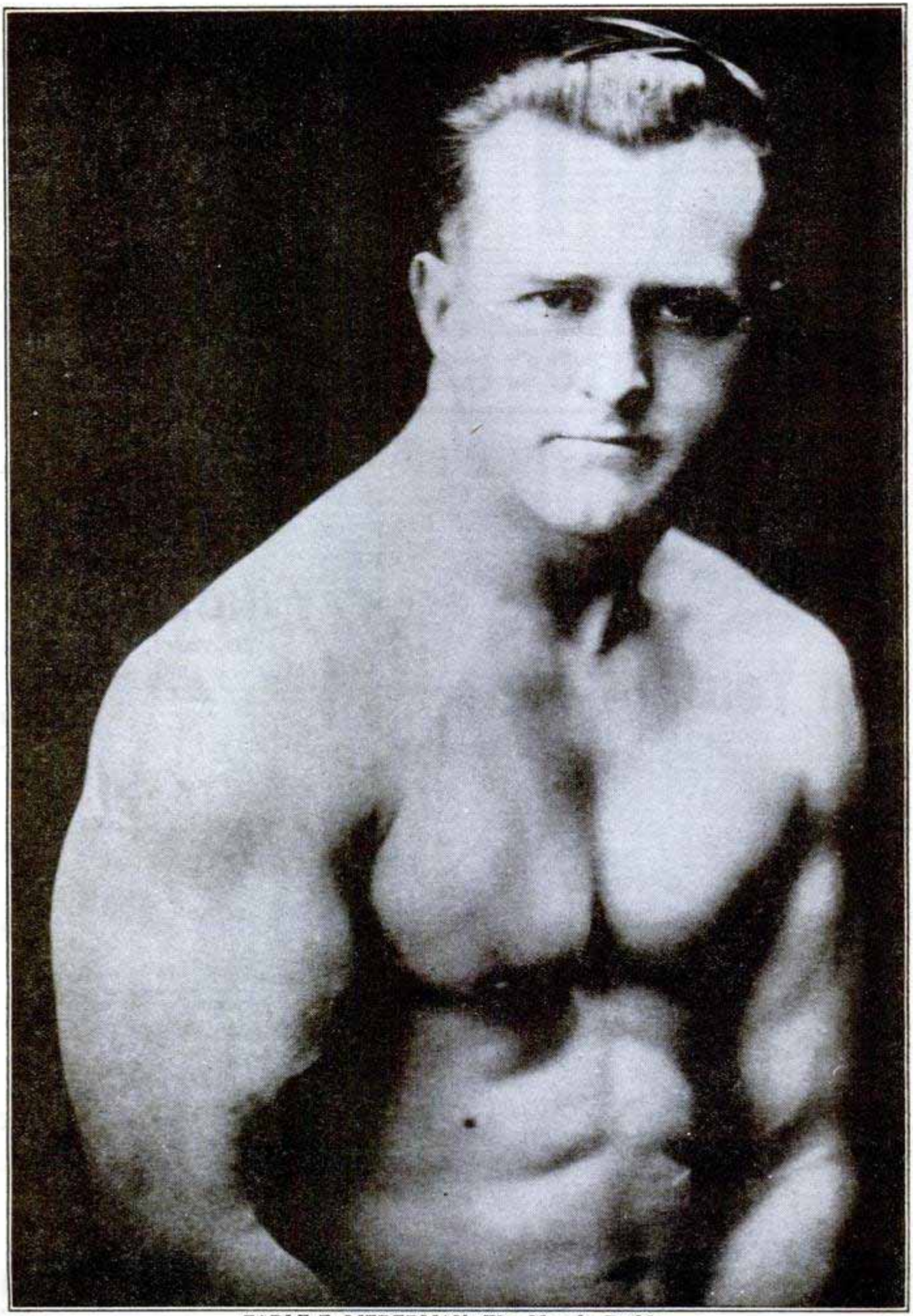

EARLE E. LIEDERMAN, *The Muscle Builder*
Author of "Science of Wrestling," "Muscle Building," "Secrets of Strength," "Here's Health," "Endurance," etc.

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The Man I Pity Most

POOR OLD JONES. I see him now, standing there, dejected, cringing, afraid of the world. No one had any use for him. No one respected him. Across his face I read one harsh word—FAILURE. He just lived on. A poor worn out imitation of a man, doing his sorry best to get on in the world. If he had realized just one thing, he could have made good. He might have been a brilliant success.

There are thousands and thousands of men like Jones. They, too, could be happy, successful, respected and loved. But they can't seem to realize the one big fact—that practically everything worth while living for depends upon STRENGTH—upon live, red-blooded, he-man muscle.

Everything you do depends upon strength. No matter what your occupation, you need the health, vitality and clear thinking only big, strong virile muscles can give you. When you are ill the strength in those big muscles pulls you through. At the office, in the farm fields, or on the tennis courts, you'll find your success generally depends upon your muscular development.

Here's a Short-cut to Strength and Success

But, you say, "It takes years to build my body up to the point where it will equal those of athletic champions." It does if you go about it without any system, **but there's a scientific short-cut.** And that's where I come in.

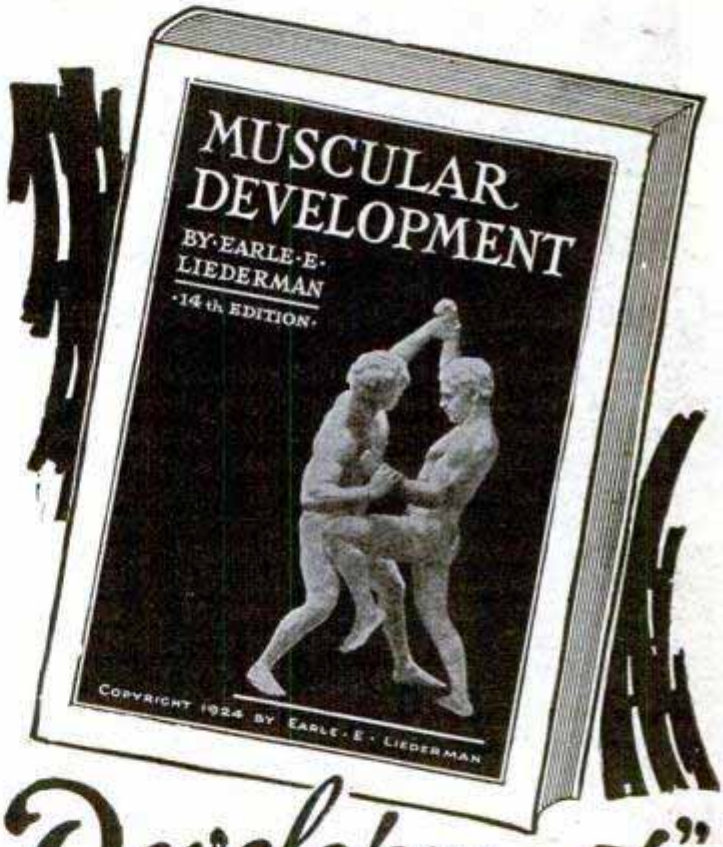
30 Days is All I Need

People call me the Muscle-Builder. In just 30 days I can do things with your body you never thought possible. With just a few minutes work every morning, I will add one full inch of real, live muscle to each of your arms, and two whole inches across your chest. Many of my pupils have gained more than that, but I GUARANTEE to do at least that much for you in one short month. Your neck will grow shapely, your shoulders begin to broaden. Before you know it, you'll find people turning around when you pass. Women will want to know you. Your boss will treat you with a new respect. Your friends will wonder what has come over you. You'll look ten years younger, and you'll feel like it, too. Work will be easy. As for play, why, you'll realize then that you never knew what play really means.

I Strengthen Those Inner Organs Too

But I'm not through with you. I want ninety days in all to do the job right, and then all I ask is that you stand in front of your mirror and look yourself over.

What a marvelous change! Those great squared shoulders! That pair of huge, lithe arms! Those firm, shapely legs! Yes, sir. They are yours, and they are there to stay. You'll be just as fit inside as you are out, too, because I work on your heart, your liver—all of your inner organs, strengthening and exercising them. Yes indeed, life can give you a greater thrill than you ever dreamed. But, remember, the only sure road to health, strength and happiness **always demands action.** Fill out the coupon below and mail it today. **Write now!**



Send For My New 64 Page Book "Muscular Development"

IT'S FREE

It contains forty-eight full-page photographs of myself and some of the many prize-winning pupils I have trained. Some of these came to me as pitiful weaklings, imploring me to help them. Look them over now and you will marvel at their present physiques. This book will prove an impetus and a real inspiration to you. It will thrill you through and through. This will not obligate you at all, but for the sake of your future health and happiness do not put it off. Send today—right now before you turn this page.

EARLE E. LIEDERMAN
Dept. 2002 305 Broadway, New York City

DON'T SEND ONE PENNY

YOUR NAME AND ADDRESS ON A POSTAL WILL DO

EARLE E. LIEDERMAN,
Dept. 2002, 305 Broadway,
New York City.

Dear Sir: Without any obligation on my part whatever please send me a copy of your latest book, "Muscular Development."

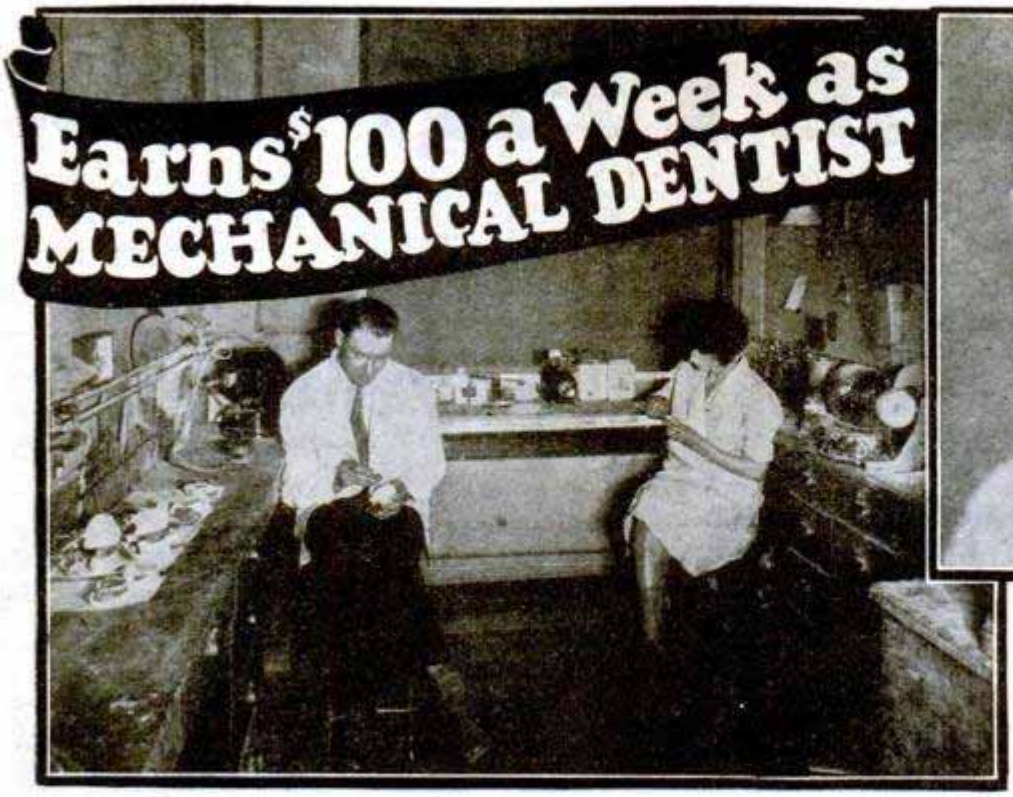
Name.....

Street.....

City.....State.....

(Please write or print plainly.)

Earns $100 a Week as MECHANICAL DENTIST



R. G. Ostrander, owner of the dental laboratory pictured at the left. He averages $100 a week. And he has only just begun to grow!

Read Ostrander's Own Story of Success After Graduating from This School—Earned as High as $45 a Day

"After completing the course in your school in five months, I was determined to open up a laboratory of my own instead of going to work for someone else. So I made arrangements with a dental supply house to equip my laboratory completely, paying them a certain amount down and arranging to pay balance in monthly installments. I have now been in business over a year and am glad to say that in that time I was able to pay off an indebtedness of $1,000 to the dental supply house, in addition to maintaining an apartment, running a car, and saving money besides. I do gold and rubber work of all kinds and have on my books a total of fourteen dentists."

"My expense in operating the lab is small and the profits big. I have done as high as $54.00 worth of business in a single day and I am sure that the profits on this business amounted to close to $45. I figure that I have done an average of $100 a week since I have been in business. As I was naturally slow at first, the average for the last six months of the year would be higher than for the first. I have taken on an assistant and am now making arrangements to cater to the Dentists in the surrounding territory, thus greatly increasing my business. I want to thank the McCarrie School for their good training, and assistance they gave me whenever I asked for it." R. G. OSTRANDER.

You Can Do What This Man Did

$100 a week inside of a year is pretty good. You can do the same! Get into this money-making profession—leave your blind-alley job—be your own boss—go and come as you please! Ostrander won out, other men are doing the same, so why not you? *"No trick for me to make $20.00 a day,"* writes one McCarrie graduate. Another says, *"I was a $30 a week bookkeeper and have built a business netting me $150.00 a week and growing all the time."*

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We will assist you in finding a sparetime job to meet part of your expenses while taking McCarrie training. And we will help you find satisfactory living quarters when you arrive. Schools located in **Chicago, Detroit, Cleveland, Boston, and Philadelphia.**

What Is Mechanical Dentistry?

Mechanical Dentistry is the laboratory bench work which the dentist turns over to the laboratory worker. Master this profession and help meet the demands of 64,000 dentists for laboratory work. Every city and every town where dentists are located offers work to the mechanical dentist. We train you in a few months in *day or night school* for this uncrowded field—*no classes—no books*—no special educational requirements.

Day or Night Schools

FREE BOOK

MAIL THE COUPON

Get our illustrated *free book on Mechanical Dentistry*. Learn the fascinating facts about this money-making business, how you can prepare for certain success like Ostrander and many others. Read scores of letters written by McCarrie graduates telling the wonderful stories of their progress. Mail the coupon and get full details of our liberal offers, and how you can begin at once to train for success!

McCARRIE SCHOOL OF MECHANICAL DENTISTRY

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Mail coupon today and get this handsomely illustrated story of MECHANICAL DENTISTRY!

FREE BOOK

McCarrie School of Mechanical Dentistry,
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Dept. 154, Chicago, Ill.

Without obligation, please send me your free Book with complete information about how I may become a Mechanical Dentist, how you will help me open a Laboratory, how you will help me find a job while I take my training, etc.

Name.....

St. No. or R. F. D.....

City.....State.....

$7,500 A Year!

C. W. Birmingham of Dayton, Ohio, was formerly a clerk in a shop, earning $15 a week. Within a short time he has increased his earnings 900% so that, today, he is making $7,500 a year. The book—"Modern Salesmanship"—proved the first rung in his ladder to Success!

$10,000 A Year!

C. V. Champion of Danville, Illinois, counts it a "red letter day" when he first read this remarkable book — "Modern Salesmanship." He says: "It enabled me to learn more, earn more, and BE MORE!" Today he is president of his company and his earnings exceed $10,000 a year!

$1,000 A Week

O. D. Oliver of Norman, Oklahoma, was local manager of a mercantile business for 17 years—finally getting $200 a month. "Modern Salesmanship" opened his eyes and started him on the road to big pay. Today he earns more in a week than he previously earned in **5 months**—or $1,000 in the last 7 days!

700% Increase

F. J. Walsh of Springfield, Mass., was a clerk earning $1,000 a year, and trying to support a wife and three children. He had to do something. N. S. T. A. training built up his income last year to $7,286—an increase of over 700 per cent.

—and They Started By Reading This Amazing Book!

Now—For a Limited Time Only—This Remarkable Man-Building, Salary-Raising Volume Is Offered FREE to Every Ambitious Man! If You Ever Aspire to Earn $10,000 a Year or More, Read It Without Fail.

NOW FREE

Where Shall We Send *Your* Copy FREE?

A BOOK! Just seven ounces of paper and printer's ink—but it contains a most vivid and inspiring message that every ambitious man should read! It reveals the facts and secrets that have led hundreds of ambitious men to success beyond their fondest expectations! So powerful and far reaching has been the influence of this little volume, that it is no wonder a famous business genius has called it "The Most Amazing Book Ever Printed."

This vital book—"Modern Salesmanship"—contains hundreds of surprising and little-known facts about the highest paid profession in the world. It reveals the real **truth** about the art of selling. It blasts dozens of old theories, explains the science of selling in simple terms, and tells exactly how the great sales records of nationally-known star salesmen are achieved. And not only that—it outlines a simple plan that will enable almost any man to master scientific salesmanship without spending years on the road—without losing a day or dollar from his present position.

What This Astonishing Book Has Done!

The achievements of this remarkable book have already won world-wide recognition. The men who have increased their earning capacities as a direct result of reading "Modern Salesmanship" are numbered in the thousands. For example, there is E. E. Williams of California who was struggling along in a minor position at a small salary. "Modern Salesmanship" opened his eyes to things he had never dreamed of—and he cast his lot with the National Salesmen's Training Association. Within a few short months of simple preparation, he was earning $10,000 a year! Today he receives as much in 30 days as he used to receive in 365!

And then there's E. G. Kinzie, of Northville, Mich. He, too, read "Modern Salesmanship" and found the answer within its pages. He quickly raised his salary from $8 a week to $100 a week, and is now organizing a company of his own. L. A. Tinnes of Minneapolis made over $600 the first month after he had mastered Salesmanship. He had formerly been working as a machinist at $160 a month. And this amazing book led Robert Ellis of New Bedford, Mass., into three promotions and trebled his income.

A Few Weeks—Then Bigger Pay

There was nothing "different" about these men when they started. Any man of average intelligence can duplicate the success they have achieved—for their experience **proves** that salesmen are **made**—not born, as some people have foolishly believed.

Salesmanship is just like any other profession. It has certain fundamental rules and laws—laws that you can master as easily as you learned the alphabet. And through the **National Demonstration Method**—an exclusive feature of the N. S. T. A. system of SALESMANSHIP training—you can acquire the equivalent of actual experience while studying. Hundreds of men who never sold goods in their lives credit a large portion of their success to this remarkable training.

Free to Every Man

If we were asking two or three dollars a copy for "Modern Salesmanship" you might hesitate. But it is now FREE. We cannot urge you too strongly to take advantage of this opportunity to see for yourself what salesmanship has done for others—and what the National Salesman's Training Association stands ready and willing to do for you. Find out exactly what the underlying principles of salesmanship are—and how you can put them to work for you. No matter what your opinion is now, "Modern Salesmanship" will give you a new insight into this fascinating and highly-paid profession. Mail the coupon now!

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Without cost or obligation you may send me your free book, "Modern Salesmanship."

Name.....

Address.....

City.....State.....

Age.....Occupation.....

Never Lonely

Since I Found This Quick Easy Way to Play The Piano—*Without a Teacher!*

LESS than a year ago I was friendless, lonely, unhappy. No one seemed to take to me. Then came the amazing event that changed my whole life. Suddenly I found myself with hosts of friends—the center of attraction—the life of every party. I was popular everywhere!

Here's how it happened!

Somehow I've never had the knack of making friends. I was never noticed at a party. Always I found myself sitting alone. I guess it was my own fault, though. I had nothing to offer! No musical ability—no gift of wit—nothing to entertain others. So I was left to myself more and more—left to dreaded solitude.

One night my spirits were at their lowest ebb and the four blank walls of my bedroom seemed to crush me like a prison. I could stand it no longer. Anything was better than that lonely room. I wandered out into the deserted streets—unconscious of the drizzling rain.

Easy as A–B–C !

The first note shown above is F. Whether you are singing from notes, playing the piano or banjo or any other musical instrument, that note in the first space is always F. The four notes indicated are F, A, C, E, easy to remember because they spell the word "face."

Certain strings on the mandolin, certain keys on the piano, represent these same notes—and once you learn them, playing melodies on any instrument is largely a matter of following the notes.

Suddenly the sound of jazz and happy laughter caught my ear. For an instant my spirits rose, and then fell as I realized that the fun was not for me. Through the open window I could see couples dancing—others talking—all having a good time.

Everything seemed to center around the young man playing the piano—Tom Buchanan. How I envied him! He had friends— popularity— happiness—all the things I longed for—*but didn't have!* I was just an outsider. I turned away with a lump in my throat.

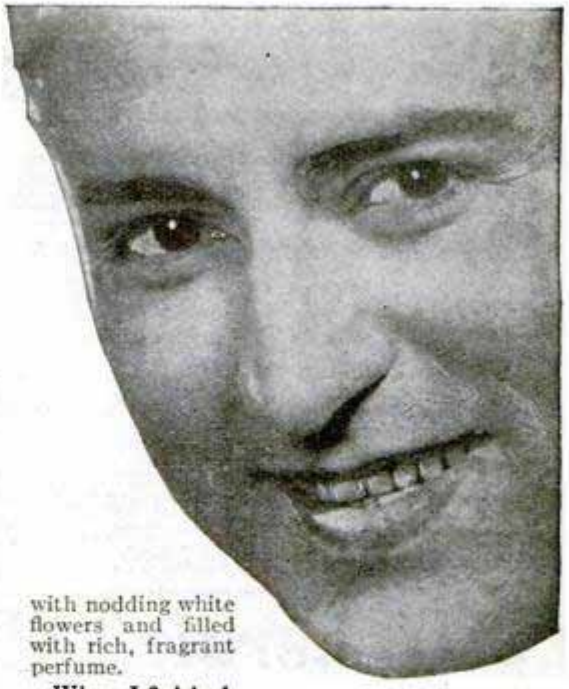
All the way home I kept thinking of that scene through the window. It depressed me. The next evening I dropped in to see Tom. He greeted me cordially:

"Hello, Dick, glad to see you."

"Feeling pretty blue, Tom, so I thought I'd call. Lucky to find you in, though. It doesn't happen very often," I answered.

"Well, you came to the right place. Music

Now!



with nodding white flowers and filled with rich, fragrant perfume.

When I finished, you should have heard them applaud! Everyone insisted I play more. Only too glad, I played piece after piece. My heart was filled with joy—for I—who had been an outsider—was now the life of the party.

Before the evening was over, I had been invited to three more parties. Now I never have a lonesome moment. At last I am popular. And to think it was all so easy!

* * * * *

You, too, can learn to play your favorite instrument by this remarkable easy "at home" method that has helped almost half a million people all over the world to increased pleasure and financial gain. And there's nothing marvelous about it. It's just a common sense practical method—so simple you don't have to know the slightest thing about music. You find your progress amazingly rapid because every step is clear and easy to understand.

Pick Your Instrument

Piano	Violin
Organ	Clarinet
Ukulele	Flute
Cornet	Harp
Trombone	Saxophone
Piccolo	Mandolin
Guitar	'Cello

Hawaiian Steel Guitar
Sight Singing
Piano Accordion
Voice and Speech Culture
Harmony and Composition
Drums and Traps
Automatic Finger Control
Banjo (Tenor, Plectrum or 5-String)

will soon make you forget your troubles."

Tom sat down at his piano and began to play. Never have I been so moved by music. The happy hours sped past as rhapsodies, waltzes, jazz hits, sonatas poured from his expert fingers. When he had finished, I sighed—sighed enviously.

"Thanks, Tom, it was wonderful. What I wouldn't give to play like that! But it's too late now! I should have had a teacher when I was a kid—like you!"

Tom smiled and said: "Dick, I never had a teacher in my life. In fact not so long ago, I couldn't play a note."

"Impossible!" I exclaimed. "How did you do it?"

The New Way to Learn Music

Then he told me about a wonderful new short-cut method of learning music that had been perfected by the U. S. School of Music. No teacher, no weary scales and tiresome hours of practice. You play real music from the start. When I left Tom, it was with new hope. If he could learn to play this way, so could I! That very night I wrote for the Free Book and Demonstration Lesson.

Three days later they arrived. I was amazed! I never dreamed that playing the piano could be so simple—even easier than Tom had pictured it. Then and there I knew I could learn to play

The course was as much fun as a game. No more dreary nights for me. And as the lessons continued, they got easier. Although I never had any "talent" I was playing my favorites—almost before I knew it. I soon would be able to play by note jazz, ballads, classical numbers, all with equal ease!

Then came the night that proved the turning point of my whole life. Once more I was going to a party, and this time I had something to offer. But I never dreamed that things would happen as they did.

What a moment that was when our hostess, apparently troubled, exclaimed:

"Isn't it a shame that Tom Buchanan can't be here? What will we do without someone to play the piano?"

Amazed at my confidence, I spoke up:

"I'll try to fill Tom's place—if you're not too critical."

Everyone seemed surprised. "Why I didn't know he played!" someone behind whispered.

Quietly I sat down and ran my fingers over the keys. As I struck the first rippling chords of Nevin's lovely "Narcissus," a hush fell over the room. I could hardly believe it, but—I was holding the party spellbound!

Then as I played, I forgot the people and lost myself in my own music. The room became a field—a field dotted

Free Book and Demonstration Lesson

Our wonderful illustrated free book and our free demonstration lesson explain all about this remarkable method. They prove just how any one can learn to play his favorite instrument *by note* in almost no time and for just a fraction of what old slow methods cost.

If you really want to learn to play—if new friends, good times, social popularity, and increased income appeal to you—take this opportunity to make your dreams come true. Now! Sign the coupon and send it before it's too late. Instruments supplied when needed, cash or credit. U. S. School of Music, 72 Brunswick Bldg., New York City.

U. S. SCHOOL OF MUSIC
72 Brunswick Bldg., New York City

Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane, Demonstration Lesson and particulars of your offer. I am interested in the following course:

.....

Have you above instrument?.....

Name.....

Address.....

City.....State.....

Your Mistakes in English STAND OUT!

YOU can not hide your mistakes in English—they stand out sharply, giving others an unfortunate impression of you. You may not make such glaring errors as "He don't," "You was," "I ain't." But perhaps you may make other mistakes which offend the ears of cultured people, and cause them to judge you unfairly.

"Can't hardly"
"He don't"
"You was"
"I ain't"

No one will correct *your* mistakes in English. People are too polite. They fear you will feel insulted, and unconsciously you keep on making the same mistakes. And, though you may think your English is good, it may be dotted with errors which *others* notice, and which destroy many of your opportunities for advancement.

What Can You Do?

For many years Sherwin Cody studied the problem of creating *the habit* of using good English. After countless experiments, he finally invented a simple method by which you can acquire a better command of the English language in only 15 minutes a day.

Under old methods rules are memorized, but correct habits are not formed. Soon the rules themselves are forgotten. The new Sherwin Cody method provides, on the contrary, *for the formation of correct habits* by constantly calling attention only to the *mistakes you make*—and then showing you the right way, so that correct English soon becomes "second nature." Already over 50,000 people have used this method with the most marked results.

FREE Book on English

A new book explaining Mr. Cody's invention is ready. If you are ever embarrassed by mistakes in grammar, spelling, punctuation, pronunciation, or if your vocabulary is limited, this new free book, "How to Speak and Write Masterly English," will prove a revelation to you. Send the coupon or a letter or postal card for it now. SHERWIN CODY SCHOOL OF ENGLISH, 52 Searle Building, Rochester, N. Y.

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Please send me your free book "How to Speak and Write Masterly English."

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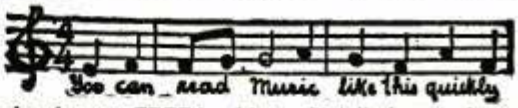

Write today for our **FREE booklet.** It tells how to learn to play Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc. Beginners or advanced players. Your only expense about 2c per day for music and postage used. **American School of Music**, 51 Manhattan Bldg., Chicago

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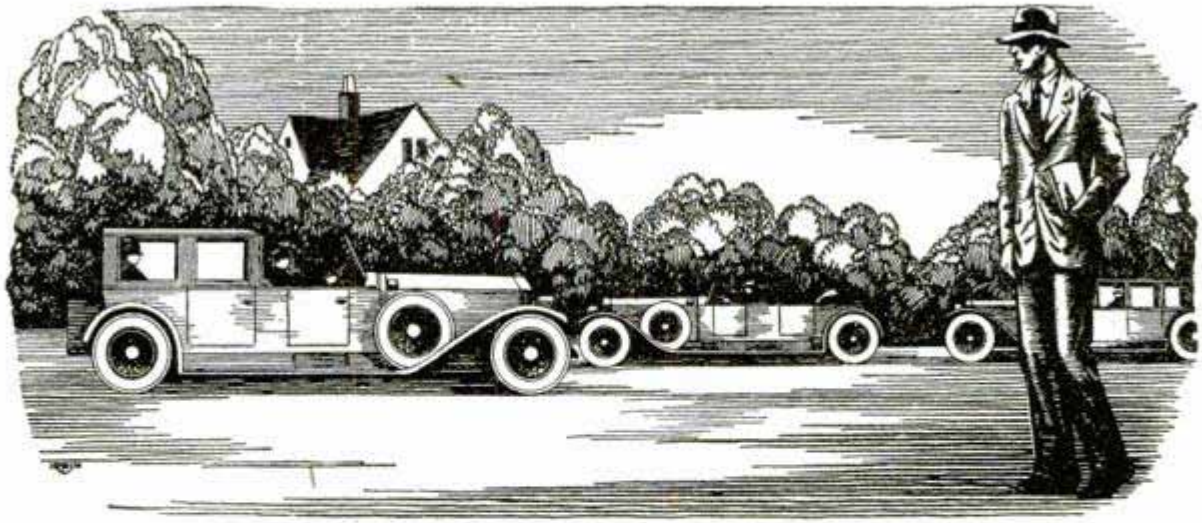

Many times in the old days, while I trudged home after work to save carfare, I used to gaze enviously at the shining cars gliding by me, the prosperous men and women within. Little did I think that inside of a year, I too should have my own car, a decent bank account, the good things of life that make it worth living.

I Thought Success Was for Others

Believe It or Not, Just Twelve Months Ago I Was Next Thing to "Down-and-Out"

TODAY I'm sole owner of the fastest-growing Radio store in town. My wife and I live in the snuggest little home you ever saw, right in one of the best neighborhoods. And I'm on good terms with my banker, too—not like the old days only a year ago, when often I didn't have one dollar to knock against another in my pocket.

It all seems like a dream now, as I look back over the past twelve short months, and think how discouraged I was then, at the "end of a blind alley." I thought I never had had a good chance in my life, and I thought I never would have one. But it was waking up that I needed, and here's the story of how I got it.

I WAS a clerk, working at the usual miserable salary such jobs pay. Somehow I never found any way to get into a line where I could make good money.

Other fellows seemed to find opportunities. But—much as I wanted the good things that go with success and a decent income—all the really well-paid vacancies I ever heard of seemed to be out of my line, to call for some kind of knowledge I didn't have.

And I wanted to get married. A fine situation wasn't it? Mary would have agreed to try it—but it wouldn't have been fair to her.

Mary had told me, "You can't get ahead where you are. Why don't you get into another line of work, somewhere that you can advance?"

"That's fine, Mary," I replied, "but *what* line? I've always got my eyes open for a better job, but I never seem to hear of a really good job that I can handle." Mary didn't seem to be satisfied with the answer but I didn't know what else to tell her.

It was on the way home that night that I stopped off in the neighborhood drug store where I overheard a scrap of conversation about myself. A few burning words that were the cause of the turning point in my life!

With a hot flush of shame I turned and left the store, and walked rapidly home. So that was what my neighbors—the people who knew me best—really thought of me!

"Bargain counter sheik—look how that suit fits," one fellow had said in a low voice. "Bet he hasn't got a dollar in those pockets." "Oh, it's just 'Useless' Anderson," said another. "He's got a wish-bone where his back-bone ought to be."

As I thought over the words in deep humiliation, a sudden thought made me catch my breath. Why had Mary been so dissatisfied with my answer that "I hadn't had a chance?" *Did Mary secretly think that too?* And after all, wasn't it *true* that I had a "wish-bone" where my back-bone ought to be? Wasn't that why I never had a "chance" to get ahead? It was true, only too true—and it had taken this cruel blow to my self-esteem to make me see it.

With a new determination I thumbed the pages of a magazine on the table, searching for an advertisement that I'd seen many times but passed up without thinking, an advertisement telling of big opportunities for trained men to succeed in the great new Radio field. I sent the coupon in and in a few days received a handsome 64-page book printed in two colors, telling all about the opportunities in the radio field and how a man can prepare quickly and easily at home to take advantage of these opportunities. I read the book carefully, and when I finished it I made my decision.

WHAT'S happened in the twelve months since that day, as I've already told you, seems almost like a dream to me now. For ten of those twelve months, *I've had a Radio business of my own!* At first, of course, I started it as a little proposition on the side, under the guidance of the National Radio Institute, the outfit that gave me my Radio training. It wasn't long before I was getting so much to do in the Radio line that I quit my measly little clerical job, and devoted my full time to my Radio business.

Since that time I've gone right on up, always under the watchful guidance of my friends at the National Radio Institute. They would have given me just as much help, too, if I had wanted to follow some other line of Radio besides building my own retail business—such as broadcasting, manufacturing, experimenting, sea operating, or any one of the score of lines they prepare you for. And to think that until that day I sent for their eye-opening book, I'd been wailing "I never had a chance!"

NOW I'm making real money. I drive a good-looking car of my own. Mary and I don't own the house in full yet, but I've made a substantial down payment, and I'm not straining myself any to meet the installments.

Here's a real tip. You may not be as bad-off as I was. But, think it over—are you satisfied? Would you sign a contract to stay where you are now for the next ten years, making the same money? If not, you'd better be *doing* something about it instead of drifting.

This new Radio game is a live-wire field of golden rewards. The work, in any of the 20 different lines of Radio, is fascinating, absorbing, well-paid. The National Radio Institute—oldest and largest Radio home-study school in the world—will train you inexpensively in your own home to know Radio from A to Z and to increase your earnings in the Radio field.

Take another tip—No matter what your plans are, no matter how much or how little you know about Radio—clip the coupon below and look their free book over. It is filled with interesting facts, figures, and photos, and the information it will give you is worth a few minutes of anybody's time. You will place yourself under no obligation—the book is free, and is gladly sent to anyone who wants to know about Radio. Just address J. E. Smith, President, National Radio Institute, Dept. 2H, Washington, D. C.

J. E. Smith, President,
National Radio Institute,
Dept. 2H, Washington, D. C.

Please send me your 64-page free book, printed in two colors, giving all information about the opportunities in Radio and how I can learn quickly and easily at home to take advantage of them. I understand this request places me under no obligation, and that no salesmen will call on me.

Name.....

Address.....

Town..... State.....

"How we saved our first $500"

"MARY and I had been married four years, but we couldn't save a cent. Fact is, we were constantly in debt and I was always worried for fear I would lose my position.

"Then one night I saw that something must be done, so I told Mary I was going to take up a course with the International Correspondence Schools. 'I've been hoping you would do that,' she said. 'I know you can earn more money if you really try.'

"So I started studying after supper at night, in the spare time that used to go to waste. It wasn't hard and pretty soon I began to see it was helping me in my work. In three months a new position was open and the Boss said he'd give me a chance at it because he'd heard I was studying with the I. C. S.

"Well, that was the start. Before the end of the year I received another raise in salary and we began to save a little each week. We've got $500 in the bank now and we're going to have a lot more soon. The Boss says he's going to give me a still better position if I keep on studying with the I. C. S."

For thirty-five years the International Correspondence Schools have been helping men to win promotion, to earn more money, to get ahead in business and in life.

You, too, can have the position you want in the work you like best. Yes, you can.

At least, find out how by marking and mailing the coupon printed below. It doesn't cost you a penny or obligate you in any way to do this, but it may be the means of changing your entire life. **Do it now.**

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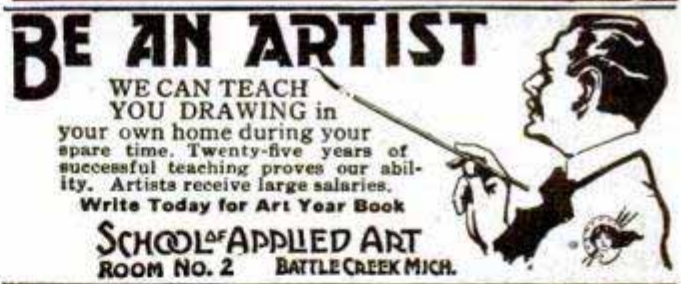

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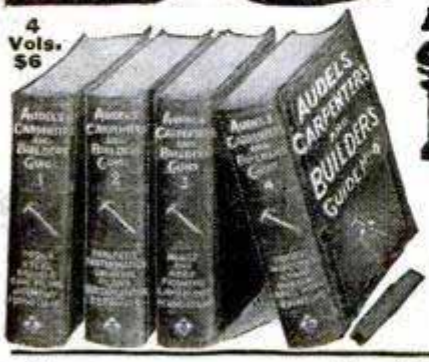

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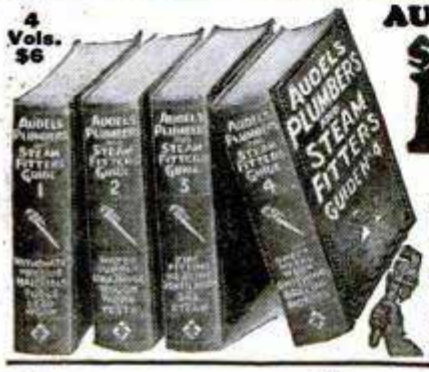

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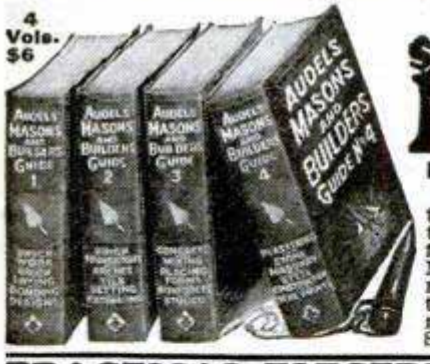

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My sporting blood boiled! "All right, I accept!" I responded. And I started across the floor.

I NEVER was much of a dancer. But when our club gave this affair I couldn't stay away. Even now, I should have been sitting safely on the "sidelines"—if the fellows hadn't made that sarcastic remark.

"Show them you can do it! Show them you can dance as well as they!" my pride whispered. And I would!

But halfway across the hall my courage died. I was nearly paralyzed with fright. There she was, waiting expectantly—Marion Blake, an exquisite dancer—graceful, poised, at ease. Suppose she should refuse? Suppose she should leave me in the center of the floor? Oh, wouldn't the fellows chuckle then!

The Unexpected Happens

"I'm—I'm sorry"—I stammered. "I guess——"

"Why, of course, I'll be glad to dance!" she interrupted. And before I realized it we were swallowed up in the dancing throng.

What a terrible ordeal it was for me! And twice as bad for her. I stumbled through the steps. I trod on her toes. I tried desperately to keep in time with the music. Yes, my dancing was inexcusable—hopelessly out-of-date!

Suddenly she suggested that we sit out the rest of the number. I blushed furiously "Now, it's coming!" I thought. "Now, she is going to tell me what she thinks of my nerve!"

But I was in for the surprise of my life. "Jim," she began softly. "I'll be frank. You're not the best dancer in the world. But you're certainly not the worst. What you need is 'brushing up' on the latest steps. Why don't you get in touch with Arthur Murray?"

"Arthur Murray! Arthur Murray!" I repeated. "He teaches dancing by mail. You can't learn that way!"

"No?" and Marion arched her eyebrows. "The truth is, that's *exactly* the way I learned—even though no one *does* suspect it!"

Naturally I was astounded, but the next evening I found one of Arthur Murray's ads and clipped the coupon. Then I mailed it, asking for his free booklet and five free lessons. If Marion could become a wonderful dancer that way it was certainly worth investigation—especially since I didn't risk a penny.

But halfway across the hall my courage died. I was nearly paralyzed with fright. There she was, waiting expectantly—Marion Blake, an exquisite dancer—graceful, poised, at ease. Suppose she should refuse? Suppose she should leave me in the center of the floor?

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The booklet and free lessons came promptly. What a revelation! They showed me how many mistakes I had been making—how *utterly ignorant* I was of the modern style of dancing, yet in a few evenings I had learned the modern Waltz—the modern Fox Trot and many delightful variations of the *very latest* steps—without music, partner or teacher!

I Turn the Tables

A week later I attended a dance. The old crowd was there. "Here he is again!" they chorused. "Give him the cigars! He earned them!" Imagine how surprised they were when I asked Marion to dance! They stood open-mouthed as I glided around the floor like an expert! Now girls are always delighted to dance with me. I laugh when I think how scared I was that terrible evening—for everywhere I go I am welcomed as an accomplished dancer!

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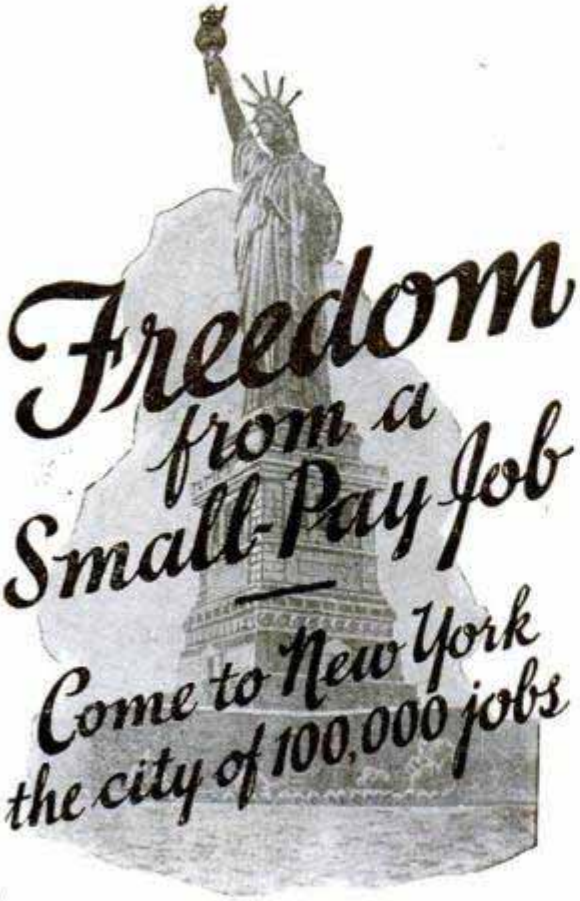

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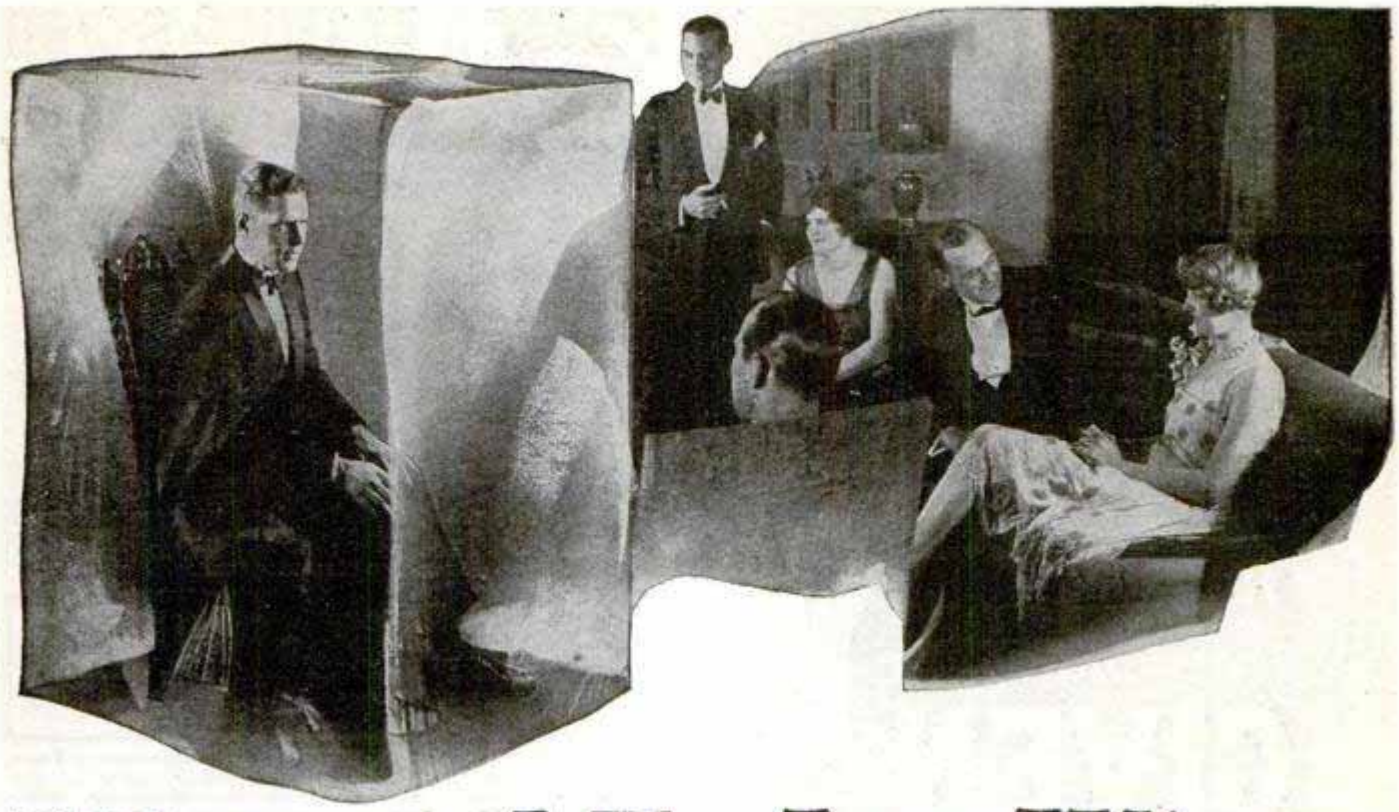

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My inability to talk was also affecting my business success. I dreaded going in and asking for a raise — I was afraid of any situation that meant using my voice—having to express myself. I didn't know how to present the ideas which I was sure the firm could use. I was just a plodder—a truck horse, capable of doing a lot of heavy work but of no use where brilliant performance was required. Often I would see men who were not half so thorough nor so hard working as I, promoted to positions where they made a brilliant showing — not through hard work, but through their ability to talk cleverly and convincingly—to give the appearance of being efficient and skillful.

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This new treatment, perfected by the Allied Merke Institutes, Inc., Fifth Avenue, New York, is based on countless experiments which prove that in an enormous number of cases hair troubles are caused by tiny parasitical germs.

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Ordinary treatments fail because they merely treat the surface skin and have little or no effect on the harmful bacteria embedded below the surface. But this new treatment, called Merke Derma Vials, penetrates *beneath* the surface—kills the infecting germs—carries off the unhealthy scaly substances which cause dandruff and falling hair—at the same time promoting a healthy circulation which supplies the dormant hair roots with the life-giving nourishment they so sorely need.

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Thousands of people from coast to coast are discovering Merke Derma Vials—the secret of new, lustrous, healthy hair. Now we welcome this convincing test. Simply take advantage of our generous free offer explained in the panel above, use Merke Derma Vial liquid yourself and see how remarkably helpful it is in ending dandruff and falling hair. Sign and mail coupon TODAY. Allied Merke Institutes, Inc., Dept. D-162, 512 Fifth Avenue, New York City.

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Millions yet to be made in radio. If you know the simple secrets of this mysterious science, you may solve a riddle and gain a fortune!

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A clothier's dummy was the first face seen in the dark

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Firecrackers on the beach solved the problem of television. A kite was the first aerial. A clothier's dummy was the first face seen in the dark.

Familiar objects and ordinary men are inventing the new applications of radio. Plain everyday citizens that know the story of radio up to today are finding fortunes in suggestions that they find in the most homely things.

If you knew what has happened in radio, perhaps you would be able to tell us how to smell, and taste and feel by radio. We only know how to hear and see now!

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If you will read "The Story of Radio" by the radio editor of the **New York Times** you will get on the right track. No experience is necessary!—no special training. Clerk, mechanic, stenographer, draftsman, electrician, carpenter, writer, mother—whatever you are, you are human. And Radio is a human science that affects every human being.

A kite first found electricity. It was also the first radio aerial.

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When you know the easily-read and easily-understood **Story of Radio**, you will know what is wanted. The simplest everday object or experience may then give you an idea—enable you to show us how to perfect television, eliminate static, transmit power by radio.

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He's making $6500 *a year now*

"I USED to know him when he was a kid—we went to grammar school together. Then his father died and he had to go to work. Got a job with Brooks & Watson as a clerk, but couldn't seem to get ahead.

"Then something seemed to wake him up. We could all see that he was doing better work.

"Then Old Man Brooks became interested—wanted to know how Ned happened to know so much about the business. Ned told him he'd been studying at home at nights through the International Correspondence Schools. 'H'm,' said Mr. Brooks, 'I'll remember that.'

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An International Correspondence Schools course will help *you* just as it helped Ned Tyson. It will help you to have the happy home—the bigger salary—the comforts you'd like to have. At least find out how.

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- ☐ Surveying and Mapping
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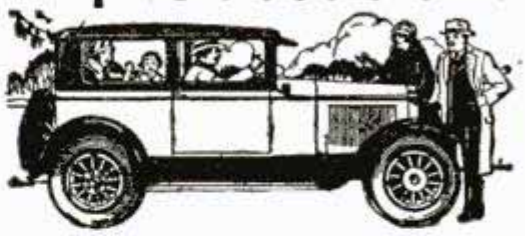

I am going to give away a brand new, latest model Buick Sedan to someone who answers this adv. We have already given away many autos. This is the most liberal offer ever made. It is your chance to win this ideal car. You can win it; why not try? The Sedan will be delivered to the winner, or winner may have the full cash value ($1,195.00) !

SOLVE THIS PUZZLE

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Can you make out the two words spelled by the numbers in the squares above? The alphabet is numbered, A is 1, B is 2, etc. What are the two words? Send your answer today—not a cent of cost to you now or later.

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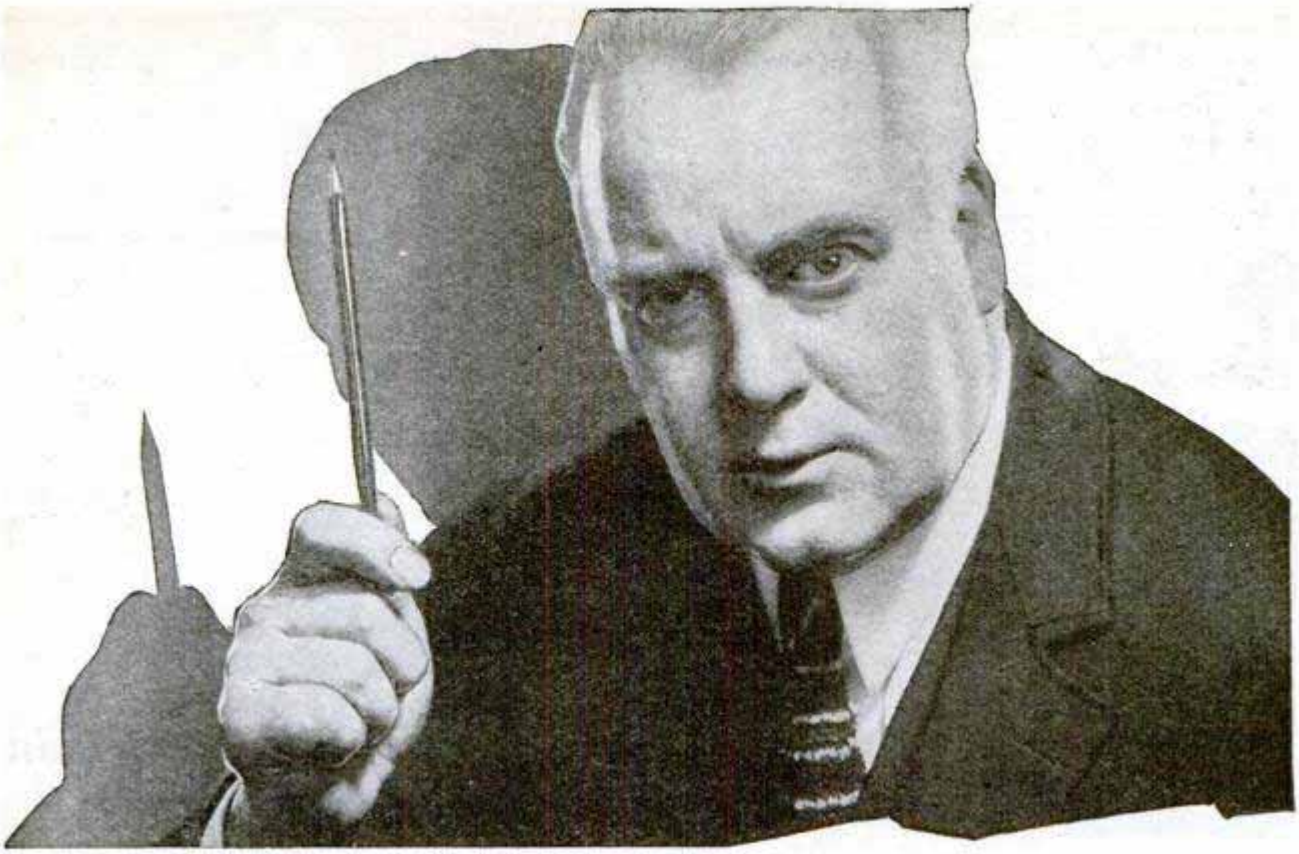

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And I'll give you the secret of these magnetic powers in just twenty-four hours—or I don't want a cent of your money.

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I'll show you how to sway the minds of others—how to always appear at your best—how to dominate all situations through the sheer force of your personality.

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The scope of "Instantaneous Personal Magnetism" is as broad as life itself. "Fires of Magnetism," "Sex Influences," "The Magnetic Voice," "Physical Magnetism," "The Magnetic Eye," "Oriental Secrets," "Rapid Magnetic Advancement," "The Magnetic Mind" and "Magnetic Healing," are only a few of the subjects covered in this amazing book. A magnificent book—entirely different from anything of the kind ever published—that tells you just how to cultivate the magnetic influence of your nature.

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3 Drafting

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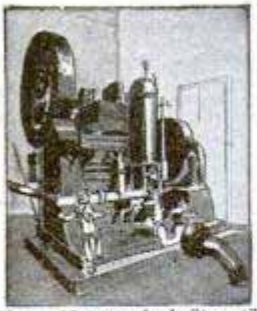

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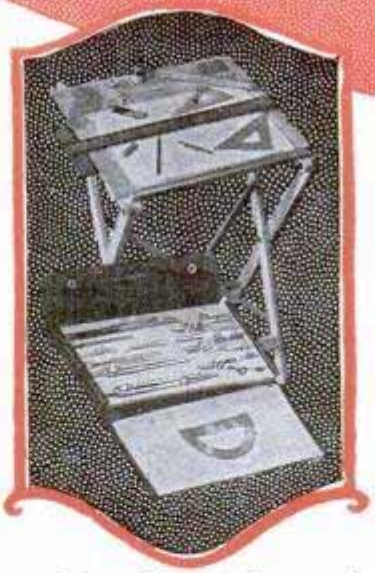

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O. C. Miller, Director Extension Work

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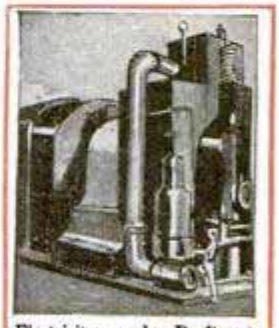

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Get them. Test your own ability to learn Drafting and get ready for a fine job and big pay. Coupon also brings surprise offer, and complete information about your opportunities for success in Drafting. *Mail It Today!*

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City of Chicago
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Gentlemen: The same day I received my diploma I got word that I was one of the two candidates who had successfully passed the examination for Deputy Commissioner of Buildings of the City of Chicago, a position paying $3600 per year.

There were eight applicants examined besides myself, all men well known to the architectural and engineering profession. Seven of these failed to obtain a passing grade of 70%. My grade was 84.69.

Inasmuch as I failed to pass this same examination three years before, my present success is mainly due to the knowledge gained through your School.

Yours very truly,
ROBERT KNIGHT

Got His Draftsman's Job

"I wanted to let you know how I came out in getting that job at the Brownell Co., Dayton, Ohio. I was to start and have a trial at Drawing, and I am still in the Drawing room. The engineer seems to like the work I make, and also the other draftsmen. I thank the school very much for getting me in at this place, because your letter of recommendation helped me a whole lot to get the job."

BERNARD WEBER,
730 St. Nicholas Ave., Dayton, O.

Liberty
High School
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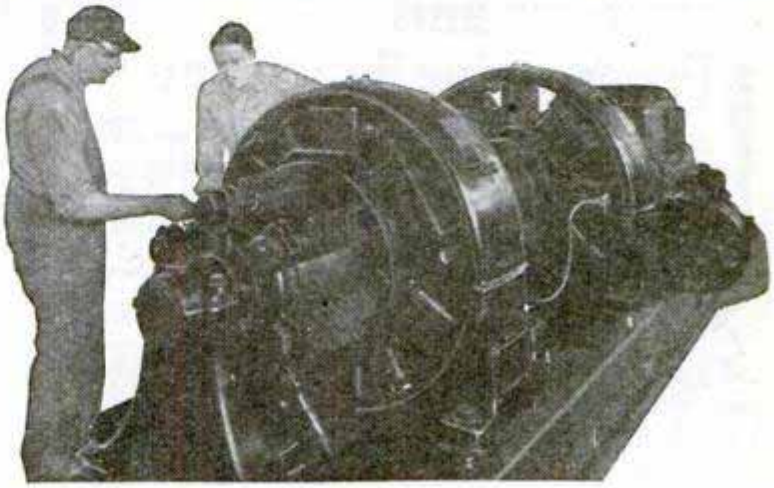

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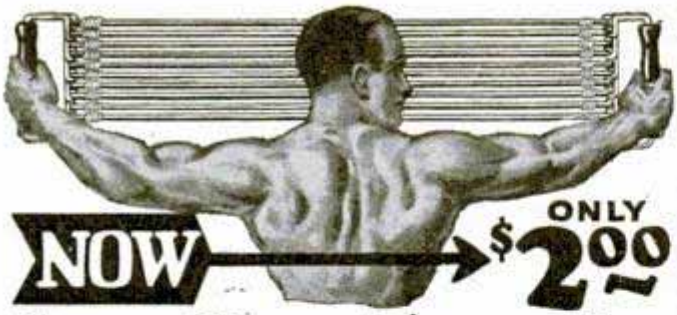

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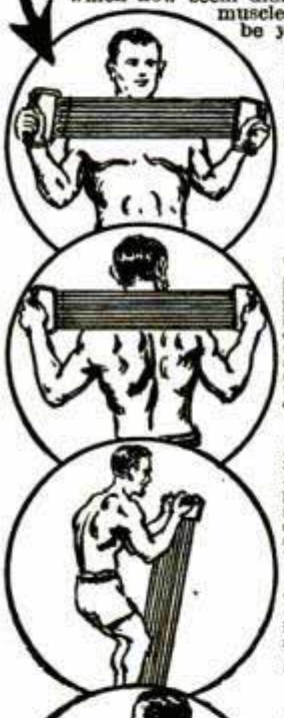

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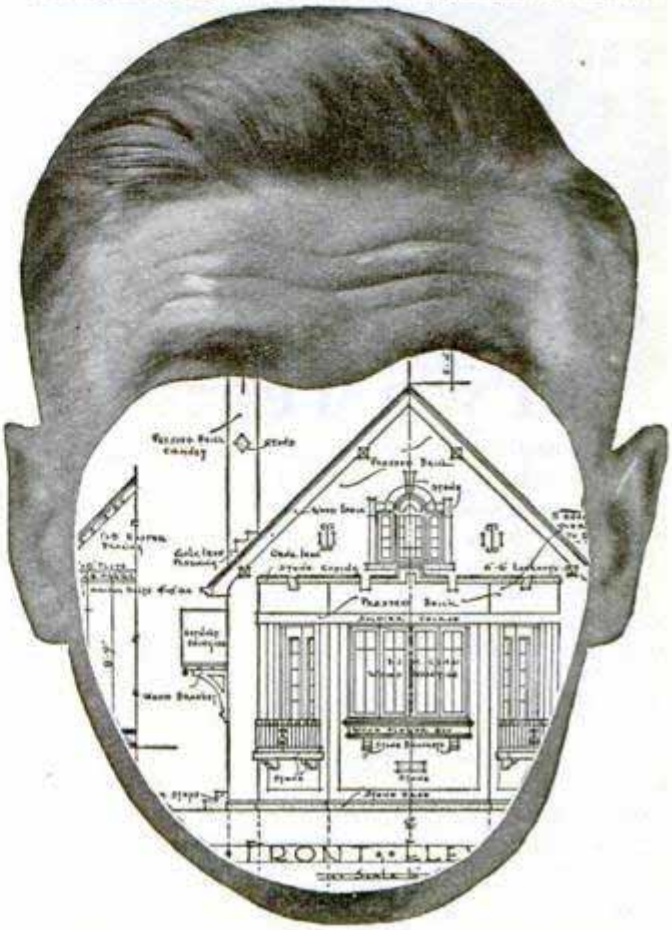

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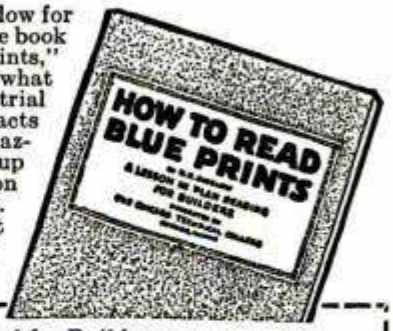

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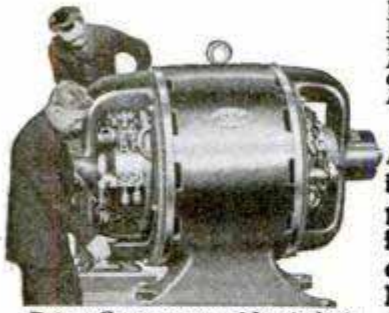

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TWELVE PEOPLE are in my Big *EMPLOYMENT DEPARTMENT* getting jobs for Greer men. You get their help AS OFTEN AS YOU NEED IT, both BEFORE and AFTER Graduation.

Get My FREE BOOK NOW

Don't let money hold you back. Get my Free Book. Find out *NOW*, how I PAY YOUR FARE HERE, let YOU ATTEND EITHER *DAYS or EVENINGS* and help you find DAY or EVENING WORK to PAY YOUR EXPENSES while learning. Then when ready we help you find the real BIG PAY JOB. LEARN how I get you ready so Employers WANT YOU, and GLADLY pay you what you are worth.

90,000 Students

26 Years Tremendous Success

Above is the important history of GREER COLLEGE. Note the steady 26-years growth, thru genuine *SERVICE*, from the tiny Shops on the left to the tremendous Building on the right, filled with GREAT TRAINING Equipment. These moves to always greater quarters mean *GROWTH—PROGRESS and SERVICE.* What is it you like—ELECTRICITY—AUTOS—or fascinating AVIATION? GREER will train you in EITHER, as *YOU SHOULD BE TRAINED.*

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Electricity—Autos—Aviation

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Would an offer of $100 a week be OPPORTUNITY or *DISAPPOINTMENT* for you? If you could HOLD the JOB it would truly be OPPORTUNITY. If you can't hold the $100 a week job, *PREPARE.* Be ready. Don't invite disappointment. Learn about GREER SHOPS. Right now if you act quick, I can make you a most unusual short time offer. Clip coupon NOW and find out. Address me personally

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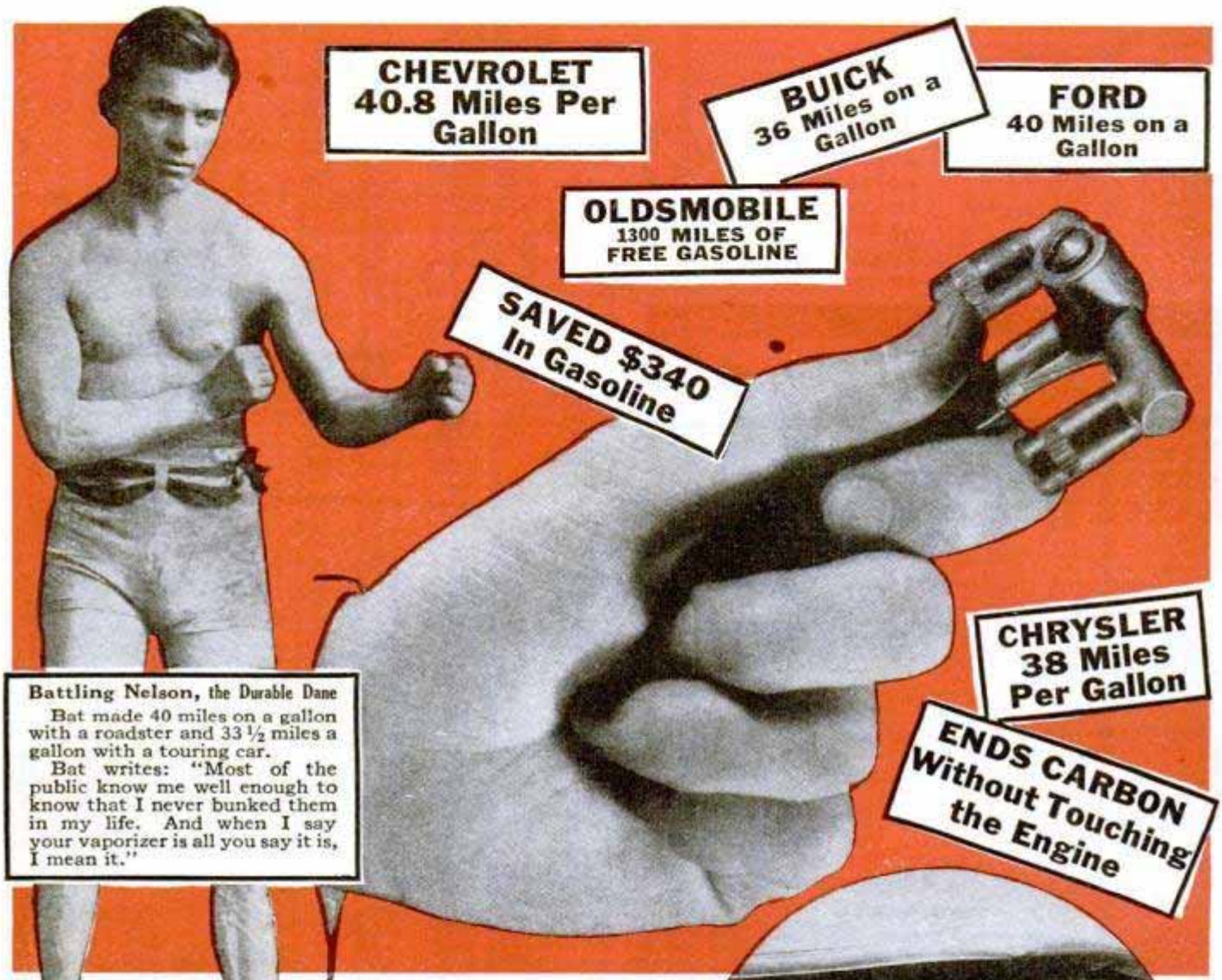
Send Free Book indicated below and details of Special offer, without obligation to me.

☐ Autos ☐ Electricity ☐ Aviation

Name.....

Address.....

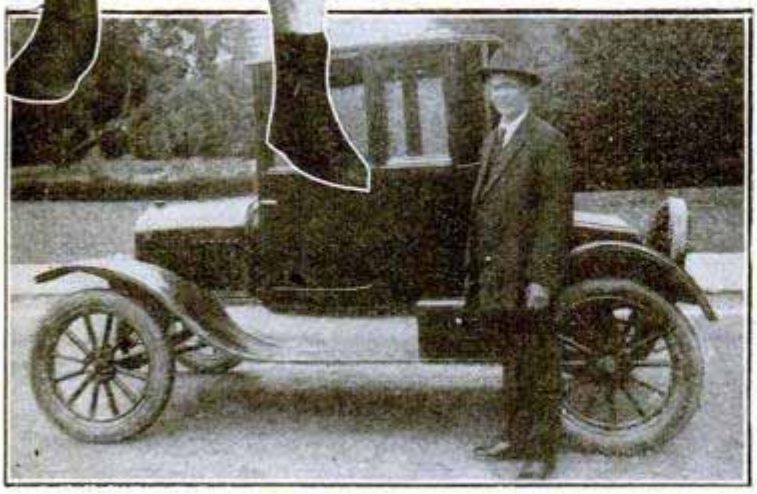
Who Else Wants



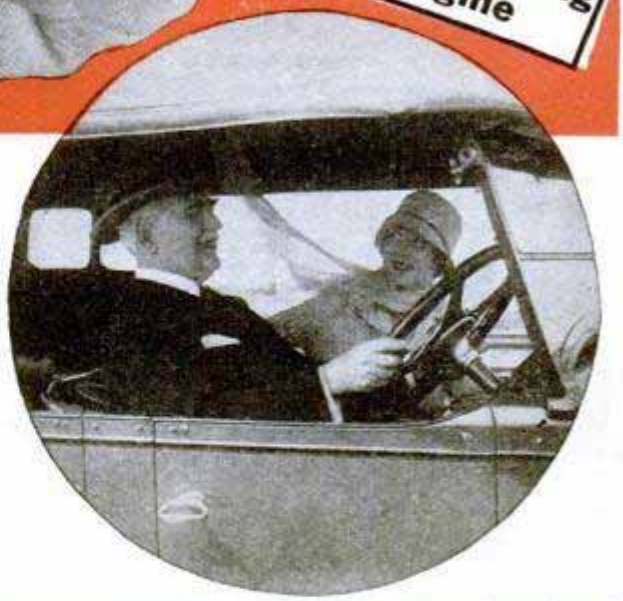
Battling Nelson, the Durable Dane

Bat made 40 miles on a gallon with a roadster and 33 ½ miles a gallon with a touring car.

Bat writes: "Most of the public know me well enough to know that I never bunked them in my life. And when I say your vaporizer is all you say it is, I mean it."



H. H. Cummings has saved 1,905 gallons of gasoline on 50,000 miles. "I have used one on my 1922 Ford which I have driven over 50,000 miles," he says. "I am getting 30 miles a gallon where before I got only 12 to 14 miles a gallon."



Drives 1300 Miles Without Buying Gasoline!

A remarkable test was recently made on the Stransky Vaporizer by J. R. Wood of St. Louis. On his Oldsmobile he had been getting only 17 miles a gallon of gas. After installing the Stransky, he drove 3,000 miles and averaged 30 miles a gallon. Thus he got in effect 1,300 miles of free gasoline.

to Save Gasoline?

A South Dakota man has discovered an amazing gas-saving invention now installed on over two million cars of every make. Already over ten thousand car owners say it increases gas mileage 25% to 50% . . . cleans out carbon without touching the engine . . . adds more speed and power . . . and saves an astonishing amount of money in gasoline and repair expense. There is a model for every car, truck, tractor or gasoline engine. Anybody can install it in a few minutes.

This invention is based on newly-discovered facts about potential gasoline power . . . startling facts, that few car owners know about. For example, it is now found that the average man wastes at least 20% to 30% of his gasoline through improper combustion. And many more interesting discoveries, too detailed to mention here.

Read on the left what other car owners say about it. Then accept the inventor's special introductory offer. He will send you samples to test without obligation to buy. If you find it doesn't do for you what it has done for other car owners, he will pay a cash forfeit for the few minutes you've spent in testing it.

Don't send a penny now. Simply send your name in coupon below and get full description of this queer little device that is saving money for other car owners. No obligation, of course. But if you really want to cut down the high cost of running your car, this is your opportunity. Tear out the coupon below and mail it to J. A. Stransky Mfg. Co., B-10 Stransky Block, Pukwana, S. Dak.

MEN EARN $100 IN A DAY

Big money selling Stransky Vaporizers. Full or spare time. Write for samples.

FORD

J. H. Alruth—35,000 miles at 28 to 30 miles a gallon.

BUICK

G. M. Rathburn—More than double mileage on 287 mile trip.

MARMON

B. Holmes, garage owner, raised speed from 72 to 84 miles per hour.

CHEVROLET

M. E. Miller—Went from 19.5 to 40.8 miles per gallon.

NASH

H. T. McCallon—Cut his gasoline cost more than half.

PIERCE-ARROW

J. Berger—Doubled gas mileage. Has never scraped carbon.

OAKLAND

C. G. Betts—Getting 30 miles per gallon of gas.

Virgil Barnes

N. Y. Giant Pitcher—Installed vaporizer in New York on Chrysler. Drove 2,000 miles home. Averaged about 38 miles per gallon of gas.

Touring in California

Above is a scene taken 'neath one of California's giant oaks. This group has been touring in a Lincoln sedan. The owner writes: "Your vaporizer has added 8 miles to my former gasoline mileage."

SAVES GAS or No Cost!

J. A. Stransky Mfg. Co.,
B-10 Stransky Block, Pukwana, S. Dak.

Yes, send me full description of this new way to save gasoline. This request does not obligate me in any way.

My name is.....

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City.....State.....

( ) Check here if you want agents' proposition.

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Fill in and mail the coupon attached and we will send you the entire set of eight volumes for ten days' Free Examination. We take all the risk—pay all charges. You assume no obligation—you pay nothing unless you decide to keep the books. Then $1.50 in ten days and the balance at the rate of $2 a month. Send the coupon NOW and see the books for yourself.

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Send me for 10 days' free examination the Croft Library of Practical Electricity. If satisfactory I will send you $1.50 in 10 days and $2 monthly until the special price of $19.50 is paid. If not wanted, I will return the books at your expense. (To insure prompt shipment write plainly and fill in all lines).

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Get me straight! The only way to learn auto mechanics thoroughly is to be right on the job, where trained instructors tell you and SHOW you what to do—then make YOU do it. Theories are fine, but practice is BETTER, QUICKER, EASIER. Books and printed lessons are all right in their way, but who wants to spend YEARS half-learning what I can teach THOROUGHLY in a FEW SHORT WEEKS?

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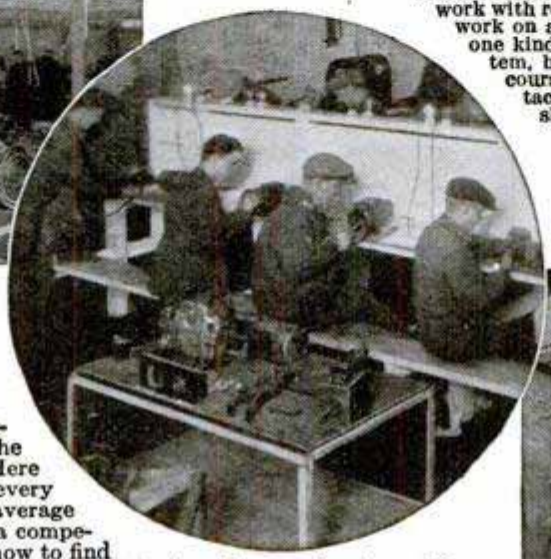
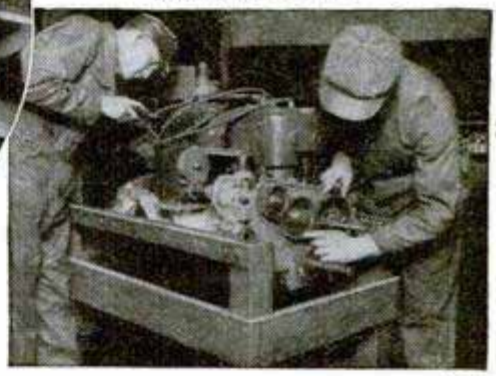
I start you right at the bottom, and take you on up step by step. NO BOOKS—NO PRINTED LESSONS. No tedious study. Nothing to puzzle you. Nothing to worry you. You'll ENJOY learning auto mechanics at my great schools, where thousands of successful men have been trained. You work with real tools and real shop equipment. And you work on all types of cars. You don't learn about only one kind of carburetor or starting and lighting system, but ALL of them. When you complete my course you will "know your stuff" and be able to tackle any kind of a job in any garage or repair shop. That's the way I train men and thousands of my graduates will tell you so.



"Mac"



Mac's Shop Plan Makes the Big-Pay Man

I originated the **shop plan** of teaching auto mechanics years ago. It is the ONE SUCCESSFUL METHOD. Here you work with every kind of tool, every piece of equipment found in the average garage or repair shop. You become a competent "trouble shooter." You know how to find out what's wrong with any make of car, truck or tractor, then go about repairing it in the RIGHT way. You can take any car to pieces, put it together again and make it run right.

McSweeny-trained men go out and get BIG JOBS after they complete the course.

D. M. Collins, a former coal miner of West Virginia, started in as manager of a garage at **$300 a Month.**

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Gayle B. Groh of Ohio made $15.00 in 20 minutes just for "trouble shooting" the electrical system of a car and repairing it when no one else in town could locate the trouble.

Come to one of my schools NOW and let me train YOU for a BIG-PAY JOB.

I Promise You Satisfaction or Money Back

I mean it. Take my course, then if you are not satisfied that I have done everything in my power to make you a competent auto mechanic, I'll refund your money. McSweeny schools live, grow and prosper only on the good-will of students. I have to make good. I take a personal interest in every student, not only while he is here, but for life. I look upon every graduate of a McSweeny School as one of "my boys" and I do everything possible that will help him and guide him on the road to success in the wonderful automotive field.

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Investigate

Let me tell you all about Mac's **shop plan** of training. Let me tell you what McSweeny graduates are doing. Let me tell you about the big opportunities in auto, truck and tractor repairing. Let me send you my remarkable tuition offer which includes

R. R. Fare and Board

Don't hesitate. Don't delay. Right now is the best time to start training to fit yourself for a big-pay job. Just mail the coupon—I'll do the rest.

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Dear "Mac": I'm interested. Please send me your big auto book FREE, and full details of your remarkable offer which includes tuition, R. R. fare and board.

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This Hawaiian Guitar expert and professor wants the opportunity to welcome you as a student so you will quickly learn how to play a Hawaiian Guitar—yes, you will be able to play just like the native Hawaiians. To get you started and help your musical success, which will bring you popularity, you will receive a beautiful Hawaiian Guitar, the same as the one pictured, when you enroll. Our short cut method of instruction will enable you to play a piece almost from the first lesson. Rush coupon for full particulars today and we will reserve a Hawaiian Guitar for you.

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So positive are we that you will become one of our students, we will send free without obligation, our first lesson. Also receive our free big book which gives particulars about our course. Write for your free book and your free lesson today.

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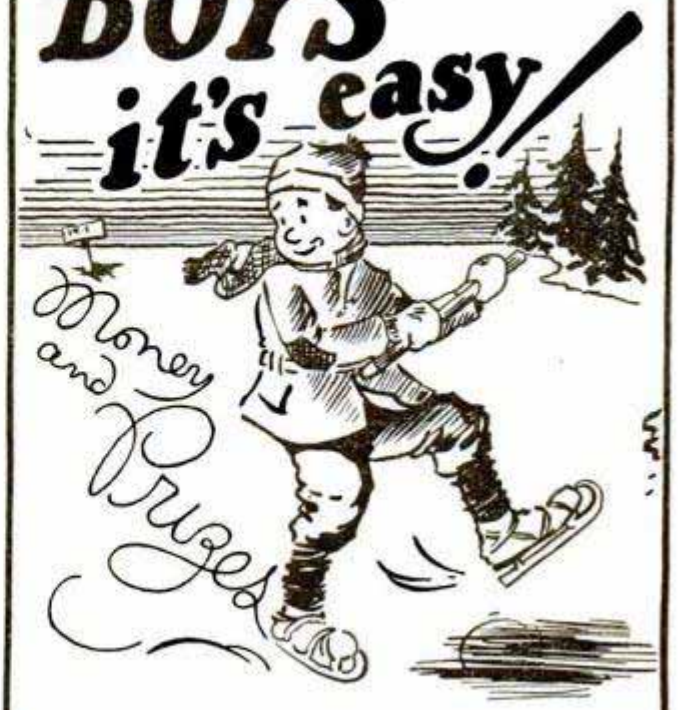

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Boys, you can carve your name where it will stay both summer and winter. Wouldn't it make you happy to be a member of a bunch of boys who always have their own skates, basketball, football and many other prizes without costing them a penny?

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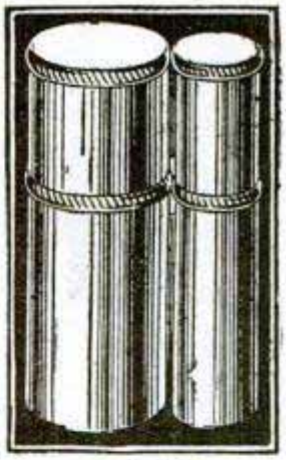
You'll be amazed when you demonstrate the Masterlite Cigar and Cigarette Lighter. You'll be astonished to see how they crowd around you, asking what makes this clever, mysterious lighter work. And when you step into the dealers' stores in your town and show them this wonder lighter, you'll find all of them eager to carry it in stock. You'll make more money than you ever dreamed possible. Whether you sell offices or factories or to dealers in quantities, here is the specialty that will ring up more dollars for you than anything.

Works as Well as $20 Lighters—Sells for 50c

The Masterlite Cigar and Cigarette Lighter works on an amazing new principle of ignition. No flint—no sparks—no matches—no friction. Insert the little filament in the wick, and a flame appears as if by magic! You can't imagine where the flame comes from or why it works. The beauty of this wonderful lighter is that it never fails to work. It lights just as quickly in damp weather as in dry weather. NO WIND CAN BLOW OUT THE FLAME! Does everything $10.00, $20.00 and $50.00 lighters do, but sells for only 50c. Fits easily into vest pocket. Beautifully made of fine metals, and will last years. We guarantee every Masterlite Lighter for 10 years. Think of it! Where else can you find such a wonderful article guaranteed for all this time? Thousands of smokers in your territory will welcome you with open arms. Dealers everywhere will give you big quantity orders. Almost overnight you'll have a big repeat business that will make real money for you.



100% Clear Profit for You

We pay you 100% clear profit on every order you take! What a whale of a profit for you! How easy it will be to pile up earnings of $10.00 and $20.00 every day. Our amazing sure fire selling plan works for you, and positively makes the sales. Every order you take leads to an everlasting repeat business that keeps paying you profits for months and months.

Order Sample or Dozen Now

Be the first in your territory to cash in on this wonder lighter. Mail coupon for dozen Masterlite Cigar and Cigarette Lighters now. This dozen costs you $3.00. Sell it for $6.00 and make $3.00 clear profit—a full 100% clear. Your money back if you don't sell the dozen in an hour. If you wish sample only, mail 50c with coupon.

But we urge you to order dozen on our no-risk plan. If they don't sell like hot cakes, return to us and we'll refund your money. You take no risk. Rush Coupon now.

Exclusive Territory

Given to Men who show us they mean business. Our plan sent with order for dozen explains everything.

Establish a Big Repeat Business with Dealers

Every dozen Masterlite Cigar Lighters comes packed in this handsome, self-filling counter display box which dealers like. Our wonderful new sure-fire plan sent free with order, explains how to make big money right from the very start as well as to build up a steady repeat business. Every dealer is eager to stock Masterlites once he discovers how fast they sell to his trade. Get in on this quantity business. You can make as much money in a day by selling to the dealers in your town as you now make in a week. Our wonderful plan tells you just how to do it. We guarantee that you will make sales and pocket profits. We take all the risk for you. If our plan fails to work, you can return Lighters to us and we will refund your money. Why be satisfied with small earnings? Build up a real dealer business you will be proud of—a business that will pay you handsome profits every week and that will enable you to make sub-agents work for you. We give exclusive territory to producers.

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DEPT. B-23

110 E. 23rd St., NEW YORK CITY

Masterlite Manufacturing Co., Dept. B-23
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I enclose $....., for which please send me order checked below.

☐ One dozen lighters packed in self-selling display cartons. You pay $3.00. Sell for $6.00.

☐ Sample Lighter—Price, 50c.

Please include FREE details of your sure-fire selling plan. You guarantee that I will make sales.

Name.....

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It's a shame for you to earn $15 or $20 or $30 a week, when in the same six days as an Electrical Expert you could make $70 to $200—and do it easier—not work half so hard. Why then remain in the small-pay game, in a line of work that offers no chance, no big promotion, no big income? Fit yourself for a real job in the great electrical industry. I'll show you how.

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Makes $700 in 24 Days in Radio

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$70 to $80 a Week for Jacquot

"Now I am specializing in auto electricity and battery work and make from $70 to $80 a week and am just getting started. I don't believe there is another school in the world like yours. Your lessons are a real joy to study."
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$20 a Day for Schreck

"Use my name as a reference and depend on me as a booster. The biggest thing I ever did was answer your advertisement. I am averaging better than $500 a month from my own business now. I used to make $18 a week."
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$3500 A Year For Beckett

"When I began with you I was just a common laborer, going from one job to another, working for anything I could get, and that wasn't much. Now my salary is $3,500 a year and the Company furnishes me with an automobile."
C. O. BECKETT,
108 Maple Heights,
New Lexington, Ohio

Be an Electrical Expert
Earn $3,500 to $10,000 a Year

Today even the ordinary Electrician—the "screw driver" kind—is making money—big money. But it's the trained man—the man who knows the whys and wherefores of Electricity—the Electrical Expert—who is picked out to "boss" the ordinary Electricians—to boss the Big Jobs—the jobs that pay $3,500 to $10,000 a Year. Get in line for one of these "Big Jobs." Start by enrolling now for my easily learned, quickly grasped, right-up-to-the-minute, Spare-Time Home-Study Course in Practical Electricity.

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You don't have to be a College Man; you don't have to be a High School Graduate. As Chief Engineer of the Chicago Engineering Works, I know exactly the kind of training you need and I will give you that training. My Course in Electricity is simple, thorough and complete and offers every man, regardless of age, education or previous experience, the chance to become, in a very short time, an "Electrical Expert," able to make from $70 to $200 a week.

No Extra Charge for Electrical Working Outfit

With me, you do practical work—at home. You start right in after your first few lessons to work at your profession in the regular way and make extra money in your spare time. For this you need tools, and I give them to you—5 big complete working outfits, with tools, measuring instruments and a real electric motor.

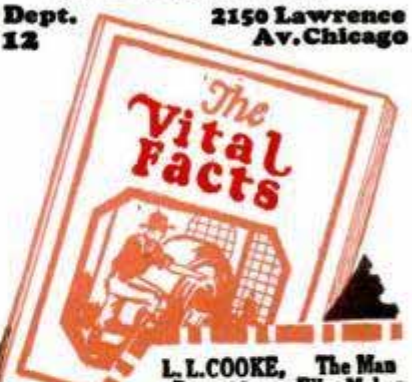
Your Satisfaction Guaranteed

So sure am I that you can learn Electricity—so sure am I that after studying with me, you, too, can get into the "big money" class in Electrical work, that I will guarantee under bond to return every single penny paid me in tuition, if, when you have finished my Course, you are not satisfied it was the best investment you ever made. And back of me in my guarantee, stands the Chicago Engineering Works, Inc., a two million dollar institution, thus assuring to every student enrolled, not only a wonderful training in Electricity, but an unsurpassed Student Service as well.

Get Started Now — Mail Coupon

I want to send you my Electrical Book and Proof Lessons, both Free. These cost you nothing and you'll enjoy them. Make the start today for a bright future in Electricity. Send in Coupon—NOW.

L. L. COOKE, Chief Instruction Engineer
L. L. COOKE SCHOOL OF ELECTRICITY
Dept. 12 **2150 Lawrence Av. Chicago**



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Occupation .....

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To be inserted under proper classification in March issue, copy should be in our office January 18th.

ADVERTISING AGENCIES

GO into the mail order business! We'll guide you. Free literature and advertising copy service. 30 years' experience behind advice. Try our proposition on this powerful pulling list. 10 leading Sunday papers —Circulation 2,800,000. 4 lines (24 words) only $16.44. Tribune, Chicago, $4.40; Star, Indianapolis, $1.20; Register, Des Moines, $1.60; Courier Journal, Louisville, $1.20; Times Picayune, New Orleans, $0.88; Star, Kansas City, $1.68; Enquirer, Cincinnati, $1.44; Press, Pittsburg, $1.44; Commercial Appeal, Memphis, $1.20; Journal, Milwaukee, $1.40. Don't pay more than publishers' rates. Write for our free book. 56 pages of advertising information containing colored U. S. Map. All leading papers, magazines and rates. Proof of insertion guaranteed. Frank W. Lenhoff Advertising Agency, 600 North Michigan Blvd., Chicago. (Established 1897). Chicago's most Progressive Advertising Agency.

A TEN Dollar Ad may put your proposition over. $10 pays for a 4 line 24 word classified ad one Sunday in 8 of the largest newspapers. Reach over 6 million readers. Minneapolis Tribune, Buffalo Courier, Detroit Free Press, Kansas City Star, Pittsburgh Press, Indianapolis Star, Atlanta Journal, Cincinnati Enquirer. Free catalogue showing other lists of newspapers and magazines sent on request. Ankrum Advertising Agency, 22 West Jackson Blvd., Chicago: Largest classified advertising agency in the world.

PUT Your proposition before several million readers weekly with newspaper classified ads. 66 page catalog free showing many bargain lists. Rates. Circulation on over 1,000 newspapers and magazines. 17 years' experience. Brinckerhoff, Inc., 37 W. VanBuren, Chicago.

ADVERTISERS Rate guide free—New 1928-36 Page Directory showing classified and display rates of best producing newspapers and magazines. We can place your advertisement in any publication at lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn St., Chicago, Ill.

ADVERTISE in 24 Big Sunday Newspapers, 24 words $15.00. Excellent for securing Agents, Salesmen, and Business Opportunities. Catalog listing 1,000 leading Dailies, Weeklies, Mail Order Magazines, Everything. Free. Wade Advertising, Baltimore Bldg., Chicago.

LOWEST Rates. New Catalog. Owl Agency, Times Bldg., New York.

28 WORDS in 350 country newspapers $10.00. Proof sent. Cope Adv. Agency, Champaign, Ill.

ADVERTISE 50 monthly magazines, 5c word, $4.00 inch; three insertions for price of two. King Co., Box 6723, Wilmington, Del.

INCH Display 50 Monthlies Thrice $8.00. Admeyer, 4112M Hartford, St. Louis, Mo.

FOR ADVERTISERS

ADVERTISER—24 Words, 10 metropolitan Sunday papers, $10.00. One inch Ad, 52 magazines, $5.00. Get our Free booklet listing many advertising, printing and mailing list bargains. Waring Advertising Company, Dundee, Mich.

40 WORDS insert 50 magazines $2.00. Empire Agency, Shawano, Wis.

INCH Display in 50 monthlies, $2.00; thrice, $4.00. Cope Agency, 233P, Champaign, Ill.

I WRITE letters, folders, booklets, complete followup for manufacturers, mail-order dealers. Long experience. Write for details. L. Taylor, 201 S. Day, Rockford, Ill.

ADVERTISE in 275 country newspapers, 28 words, $10. Keator, Hartford Bldg., Chicago.

LETTER SPECIALISTS

BUSINESS-Building Mailorder Letters —circulars—folders—campaigns. Investigate! Finkel Advertising, 15p Fairview, Jersey City, N. J.

NEW Ideas Created For Letters, Folders, Booklets by Stevens at his Ad-shop, Martin Building, Utica, N. Y. Send your problem for free recommendation.

LETTERS, sales literature written. Long experience. Reasonable. L. Bartells, 504 52nd St., Milwaukee.

SALES PROMOTION

$50 TO $50,000 Daily Sales Developed During 28 years for clients by our direct mail plans, copy, campaigns. One product, 1923, an idea; this year $100,000 orders booked. Fifty year old concern desired 50 national representatives in 1925; we produced 40 in three months. 700 dealers in 10 months at $3 each, for another. Ten years Sales Promotion Manager Larkin Co. Submit sales problems for Free diagnosis. James C. Johnson, 118A Woodbridge Ave., Buffalo.

GOOD Business Lettered; Bad Improved. Fifty years valuable experience, satisfaction guaranteed. Popular Science, 430 F.P. Milwaukee Ave., Chicago.

AUTOMOBILE SUPPLIES

JUNK Tires converted into salable Mds. with our Hoxie. $200 starts you. Vulcanizing Tires pays 100%. Have Shop Outfits near you, $50 up. Make $15 per Day painting Cars, Furniture, decorating with our portable Electric Air Compressor Outfit, weight 50 lbs. Worth $100. Our price with Sprayer $56, delivered. Catalog free. Equipment Exchange, 108 East 11th, Los Angeles, Calif.

AT Last! Reasonably priced Auto Emblems for every Lodge. Sells for only $1.25. Write for attractive selling proposition and free Sample Case offer. North Central Distributors, Dept. 9, Ashland, Ohio.

AUTO Owner: If interested in reducing your gasoline bill, use our Standard Fuel Economizer. New invention. Automatic. No heating. We deliver by mail on receipt of $2.00. Standard Vaporizer Co., Mobile, Ala.

YOU Are Wanted to Resilver Mirrors at Home. Immense profits plating autoparts, tableware, etc. Write for information. Sprinkle, Plater, 77, Marion, Ind.

SLIP-Over tops make perfect Winter enclosures for your roadster or touring car. Patents Pending. Agents, Owners, write Slip-Over Top Co., Norwood, O.

RADIATORS at wholesale prices. All standard makes. Satisfaction guaranteed. Send for prices, stating make and model. Independent Radiator Co., 1119 S. Wabash Ave., Chicago.

FAMOUS Silverbeam Automobile Spotlight postpaid $1.50. Money Order or stamps. Kaufmann & Sons, Santa Ana, Cal.

AUTOMOBILES

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

BUILD your camping outfit in your sedan completely concealed. One trip pays cost. Illustration 25c. Working drawing $5. Berts Designing, Inc., 3137 La Fayette Ave., St. Louis, Mo.

GASPEP. Concentrated ethyl; hill climber; 600 miles more, $1. Lunan, Rockland Ave., Malden, Mass.

AUTOMOBILE SERVICE EQUIPMENT

BARGAINS in repossessed Battery Chargers, Rectifiers of all kinds, a few Constant Potential 8 Hour Chargers—two of them practically new. Very low prices and terms arranged while they last. I. C. Helmick, Box M283, Troy, Ohio.

AUTOMATIC Air Compressors, Paint Spray Outfits in sizes to fit the smallest and largest business. Only equipment of this kind on the market using the Silent, Spiral, Bevel Transmission. Low prices, easy terms. Automatic Compressor Co., Box M284, Troy, Ohio.

STARTING — Lighting — Ignition service most profitable in Automotive field. Small investment, Big Profits, Pleasant Work. New HB Test Bench brings you this business. Low price, easy terms, 30 Days Trial. Write for new bulletin TB. HB Test Bench Division, Box M285, Troy, Ohio.

FOR FORD OWNERS

UNDERSLUNG with "RKO" Swing Lo Irons. See "Red-i-Kut" ad page 151.

MOTORCYCLES, BICYCLES AND SUPPLIES

MONEY Saving Motorcycle Bargains—Large stock of Used Harley-Davidson—$50 and up. Send for Free bargain bulletin—Genuine Harley-Davidson Parts and Accessories. Knuth's Harley-Davidson Agency, 2525 Fond du Lac Ave., Milwaukee, Wis.

MOTOR Cycles Cheaper than Bicycles. $25 to $50. Ready to Ride. Tires, $2.50; Frames, $3; Forks, $3; Tanks, $5; Wheels, $4; Chains, $2; Handle Bars, $5; Engines, $15; Auto Tires, $3; Airplane Engines, $15. Send 30c in Stamps for Catalogues. Price Cutter Deniger, Rochester, N. Y.

BARGAINS in used motorcycle parts for all makes. No Catalogs. J. B. Dahl, 3661 Archer Ave., Chicago, Ill.

INDIAN sidecar $19.50. Schefler carburetor $2.75. Dixie Magneto $5.00. Earl Warring, Parkersburg, Iowa.

FAMOUS Silverbeam Motorcycle Spotlight postpaid $1.50. Money Order or stamps. Kaufmann & Sons, Santa Ana, Cal.

NEW and used Motor Cycle Parts. Tower Cycle Co., 3604 Kingsland Ave., Pine Lawn, Mo.

AVIATION

LEARN to Fly; $100.00 including Solo. We guarantee to solo you regardless of the number of flying hours required. Our instructors are ex-army aviators and air-mail pilots with wide experience. Our training equipment is the best obtainable. Our course requires about two weeks, depending on the individual. No bond required, no charge for breakage. Eight years without an accident. 76 students graduated in 1925. Commercial aviation is a rapid growing industry. Don't delay! Enroll now in one of the oldest and best known flying schools in Ameria. Write for booklet. Robertson Aircraft Corporation, operators of the United States Air Mail, St. Louis-Chicago, Lambert-St. Louis Airport, Anglum, Mo.

HOME Study Course in aviation $15. Thorough, complete, including motors, wings, fuselage, bracings, assembly construction, design drawings, nomenclature flying, flight principles, air rules, meteorology, navigation and 50 other subjects. $18 on time, $3 down, $3 weekly or monthly. Diploma given, free employment service. Enroll now or write Romby National Aeronautical School, Dept. A, 510 Detwiler Bldg., Los Angeles, Calif.

AIRPLANES Motors and Aircraft Supplies; 28 hp., 2 cyl. Lawrence motors $125; 130 hp., Clerget 9 cyl. rotary motors $150. Leather breeches $12.00. Sheep-lined leather coat $23.50; wool-lined $18.00. Beaverized sheep helmet $7.00. Sheep-lined helmet $4.50. Non-shatterable, wide-vision goggles $1.50, or oval $2.50. Sheep-lined moccasins $5.50. Logan Aircraft, 716 W. Superior, Cleveland.

LEARN Aviation. Complete courses flying taught by experienced men the year round at one of the oldest schools in the country. Learn aviation in all its branches or specialize. Applied airplane mechanics, aerial navigation, airplane design and construction. Also a home study course. Write for details of opportunity in 1928 for aviators. Varney School of Flight, 1813 Main St., Peoria, Ill.

COMPLETE Flying course. We guarantee to teach you to fly safely and steadily regardless number hours needed. Course includes practical flying instruction, theoretical principles, mechanical knowledge of airplanes and motors. All instruction on modern aircraft by licensed Transport Pilots of long experience. Write for Free booklet. Von Hoffmann Aircraft Co., Distributors for Ryan Monoplanes and Eaglerock Biplanes. 202 Lambert-Saint Louis Flying Field, Anglum, Missouri.

FLY with a winner. (Nat'l Air races 1926 and 1927) and one of America's oldest pilots. We have been building and flying airplanes for 20 years, operate a real aircraft factory with excellent equipment. Work in our factory guaranteed to day students. Terms and employment service can be arranged for students short of funds who take our special winter evening course. Airplane agency available for students. Heath Airplane Co., Chicago, Ill.

EAGLEROCK—Government certified, three place commercial ship. Largest production and demand in world. Sold on time payments if desired. $2,475, Denver. Write or wire Alexander Aircraft Company, Denver, Colo.

FLYERS, Students—A short but complete course in designing, building and operation of aeroplanes. Postpaid 25c. James Aircraft, 1029 Walnut Street, Allentown, Pa.

"AVIATORS" Wanted. Pilots and mechanics. We prepare you in short time. Special rates for winter classes. Send for free booklet, "The Why's, Where's, How's of Learning 'Aviation.'" Atkinson Aviation Company, Dept. D, Gary, Ind.

SPECIAL Courses for pilots, mechanics, salesmen, field managers, etc. Modern equipment. Capable instructors, rates reasonable. McMullen Aviation School, Tampa, Florida.

TO introduce our aviation books we are distributing as prizes an airplane and a $250 course in flying among first 5,000 purchasers. Write for particulars. Pearson Aviation Company, Coalwood, W. Va.

LEARN to fly. Complete course $175.00. Excellent instructors and equipment. American Beauty Aircraft Co., 3420 Elston, Chicago, M'f'rs. American Beauty Airplanes.

NEW nine-cylinder Gnome aeroplane engine $85. Avro airplane complete with 120 H.P. Le Rhone motor, propeller, etc., $475. Albert Latshaw, Clarion, Mich.

HEATH propellers won at the National Air Races again! They represent the most efficient method of aerial drive. Each propeller individually designed for the particular work to be done, as laid out by America's oldest aeronautical engineers. Propeller Catalog 4c. Heath Airplane Company, Chicago, Ill.

LEARN To Fly this Winter; Fifteen hours flying instruction, shop practice and Ground School Lectures, $250 cash. Special offer this month—we will furnish work to pay your board and room. Come at once or write for catalogue. Porterfield Flying School, 2330 Harrison, Kansas City, Mo.

THE American School of Aviation announces a new correspondence course in Mechanics of Aviation. A thorough training in Practical Aeronautics. American School of Aviation, Dept. 1871, 3601 Michigan Ave., Chicago, Ill.

"MODERN FLIGHT," by Chief Pilot Clevenger. Ten years' flying experience form the basis for this simple, complete book of instruction on the operation of an airplane. Send One Dollar to Alexander Aircraft Company, Denver, Colo.

WINGS, New covered for Heath parasol monoplane crated $25.00 Few sets remaining. Assortment of parts for aeroplane builders. Aeroplane motors. Lawrence new $125, used $90, Gnome 165 h.p. $40. Curtiss propellers for snowsleds $5, other types also. Two pairs army aviators goggles postpaid $1. Write for new list. Special 50 h.p. motor $90. Midway Aero Co., Box 283, St. Paul, Minn.

AERIAL Propellers manufactured to order. Airplanes manufactured and rebuilt. Flying Instruction by the hour or course. Northland Aerial Service, 2814 Broadway, Chicago, Ill.

SEND dime for 12 inch mounted propeller and circulars on free three foot model aeroplane. No selling. Aero Shop, 3650 Hurlbut Ave., Detroit, Mich.

20x4 BALL-BEARING airplane wheels, tires and tubes. Just right for Sport Plane or small automobile. Number limited. Order to-day. Lincoln Aircraft Company, Lincoln, Nebr.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

STUDY Aviation by Blueprints: Monoplane, Biplane, Symbols, Nomenclature, Mailmap, Wing sections one foot wide. Each $1.00. Paul Schroeter, 452 Broadway, Milwaukee.

AIRPLANE Motors, 28 to 200 H.P.—$50.00 to $300. Propellers $5.00 to $25.00. Good used leather coats $7.50. Smith Machinery Co., P. O. Box 1343, Houston, Texas.

SEND 25c for Constructional Details of Lincoln Sport Plane and book Flight. Lincoln Aircraft Company, Lincoln, Nebr.

BIGGEST, Best Catalog Model Airplanes, Parts Supplies; 5c postpaid. Ideal Company, 165½ Spring Street, New York.

FOR Sale: 180-Hisso Swallow one year old Motor and Ship, excellent condition, must sell for $1,250.00. Box 303, Guymon, Okla.

BUILD and fly your own Monoplane. 20-foot wing spread, 72 MPH, with only 12 HP motor. Plans and working drawings complete, $10.00. Warner Co., 311 Edwards Bldg., Cincinnati, Ohio.

85 M. P. H. Aerodrive Sled-Blueprints. Only 50c. Other sled and boat prints 50c each. Ostergaard Aircraft, 4305 North Narragansett, Chicago.

BOOKS AND PERIODICALS

1927, THIRD edition revised. "Radio Theory and Operating," by Mary Texanna Loomis, President Loomis Radio College; member Institute Radio Engineers. 886 pages, 700 illustrations. Used in all Government and private radio schools, many colleges and high schools. Comprehensive, up to date, the standard on radio. Price, $3.50, postage paid. At your book store, or order direct from Loomis Publishing Company, Dept. M, 403 Ninth, Washington, D. C.

"THE Personal Liberty Course"—A clever combination of mirth, information and instruction for quickly overcoming fear, bashfulness and physical complexes in men. No drugs, no gymnastics. Full particulars free, sealed. Harry J. Gardener, P. O. Box 607, Station C, Los Angeles, Calif.

CURIOUS Books, Unique Novelties, Stunning Pictures. Samples, 10 cents Prepaid. Linds, 214 W. 34th Street, New York.

LEARN to draw; Commercial art and cartooning; complete course of self-instruction; 125 illustrations $2.00. 15 imported art postals, $1.00. Sample and lists, 10c. Girard Novelty Co., (P.M.) Pawtucket, R. I.

BOOK Manuscripts wanted; published on cooperative plan. Circular free. Meador Publishing Co., 27 Beach, Boston, Mass.

HYPNOTISM Wins health, wealth, fame, love. 25 easy lessons and 248 page reference guide $2.00. Popular Science, 430, PF, Milwaukee Ave., Chicago.

ARTISTS', Painters', Decorators' Books. Catalog 10c. King, box 1482, Indianapolis, Ind.

THREE red stamps will bring you our interesting Bulletin on Money-Making Stunts. The Cervenec System, Box 4, Buffalo, New York.

FREE, wonderful 624-page Dictionary. Box 29C, Station L, New York.

BOOKS of all the sciences. Also real unusual helps on any inventive ideas. Of least expense. Guarantees. Box 10, G. P. O., New York.

BOOK of Luck, lucky numbers, superstitions, etc. 25c. Circulars. F. & R. Co., 87 Fourth Ave., New York City.

Old Money Wanted. Do you know that coin collectors pay up to $100.00 for certain U. S. cents? And high premiums for all rare coins? We buy all kinds. Send 4c for large coin folder. May mean much profit to you. Numismatic Co., Dept. H-2, Fort Worth, Tex.

INDUSTRIAL Alcohol, Wright's book. Full directions for making, fully illustrated. $2.50. Spon & Chamberlain, 120 P.M. Liberty Street, New York, N. Y.

PICTURES AND POSTCARDS

225 MOVIE Stars Photographs. Catalog; Photograph 10c. Belmont Shoppe, PM-3, Downers Grove, Ill.

FREE—Send address for beautiful 5x16 art print. C. C. Dry, Box 337, Canton, Ohio.

ART Pictures—300 All Different. Particulars 10c. Howard Sales Co., Dept. 15, 1188 Folsom St., San Francisco, Cal.

MAGIC TRICKS, BOOKS AND JOKER NOVELTIES

AMAZE and Mystify! New 1928 "Fun-Magic-Mystery," profusely illustrated; explains many tricks. Also catalogs 750 Tricks—Illusions—Jokes—Puzzles—Books—Imported Novelties at Reduced Prices. Postpaid 10c. Lyle Douglas, Station A-5, Dallas, Texas.

SERPENT of India, $1.00. Money Making Machine $1.50. Big catalogue Magic Tricks—Jokes—Pocket Novelties..15c American Specialty Company, Swampscott, Mass.

ILLUSION and Trick Catalog 20c. Lynn's, 105 Beach, Jersey City, N. J.

CARD tricks. Coin tricks. Hypnotism. Ventriloquism. 64-page books. Complete guides. 10c each. Geo. Fenner, 2401 Jefferson, Louisville, Ky.

EIGHT mysterious illusions explained, including secrets of sensational trunk and handcuff escapes—50c Information 2c. William King, Corvallis, Oreg.

FREE—Our puzzle, trick, game, joke, Novelty Catalog. Wright & Son, 601-G Indiana Ave., Peoria, Ill.

MAGIC—Tricks, Books and Supplies. For Amateurs as well as the great professionals. Anyone can learn through our instructions. Feature Acts in Mind-Reading, Spiritualism, Rope Ties, etc. Large illustrated Professional Catalog, 20c. Chicago Magic Co., 140 So. Dearborn St., Dept. B, Chicago, Ill.

FREE with $25 order die box. Send 20c for our large catalogue of tricks, wigs, sensational escapes. Oaks Magical Co., Dept. 548, Oshkosh, Wis.

THE Flapper. A snappy joke novelty with a real shock 10c. Bowman Novelty Co., Racine, Wis.

ELECTRIC Fun! Seventy stunts, 110 volts, $1. TaCutting, Campbell, Calif.

SEVEN Magical Delusions and Catalogs—25c. Gilmagico, Morgan Park, Ill.

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LEARN Ventriloquism By Mail—Small cost. 2c stamp brings particulars. Geo. W. Smith, 125 North Jefferson, Room S-242, Peoria, Ill.

PLAYS, Musical comedies and revues, minstrel music, blackface skits, vaudeville acts, monologs, dialogs, recitations, entertainments, musical readings, stage handbooks, make-up goods. Big catalog free. T. S. Denison & Co., 623 So. Wabash, Dept. 11, Chicago.

NOVELTIES AND CURIOS, ETC.

30 DIFFERENT Sea Curiosities. $1.00. Ray Oviatt, Sarasota, Fla.

STAMP COLLECTING

500 DIFFERENT Stamps for 25c! Big Collection 500 Different Stamps from Bosnia-Herzegovina, Crete, Epirus, Hong Kong, Iceland, Kenya and Uganda, Liberia, Malta, Nyassa, North Borneo, Orange River Colony, Siam, Wallis and Futana, and other "hard" countries. Catalogue value $10.00. Price only 25c to Approval Applicants! Special Bargains, 1,000 different 79c; 15 triangle stamps 49c; 100 Africa 45c; 100 Asia 50c; 100 Balkan States 35c; 100 British Colonies 25c; 100 French Colonies 30c; 100 Portugese Colonies 50c. All 8 packets for $3.00! Illustrated Lists Free. Loma Stamp Co., 3926 32nd Street, San Diego, Calif.

MYSTIC'S "Queer Country" Packet! Contains scarce stamps from the following strange lands: San Marino, Antioquia, Congo, Cyprus, Fiji Islands, Gwalior Hyderabad, Iceland, Jhind, Kenya, Uganda, Lebanon, Monaco, North Borneo, Nyassa, St. Thomas Prince, Port. Guinea, Siam, Sierra Leone, Tanganyika, Trinidad Tobago, Ubangi, Upper Volta, Wallis Futuna, Zanzibar. Get this wonderful packet of "freak countries" and make your friends envious! Price only 10c to approval applicants! Write today. Mystic Stamp Company (Dept. 8), Camden, New York.

"1000 U. S. & Foreign Mixed 25c." "Johnel," 3114 Seminary Ave., Chicago, Ill.

$1.00 FREE. Black U. S. Postage, Given Away with each order. Pioneer Stamp Album with 500 illustrations. 150 different stamps from 40 countries, Syria, Lebanon, Hejaz, Liberia, New French Colonies, British, Portuguese Colonies, South Africa, Australia, 500 hinges, 36 page illustrated catalogue. All for 15c. Big Commission to Agents for the Best approval sheets of stamps ever offered. Write for sample outfit. Hussman Stamp Co., Dept. M, 620 Olive St., St. Louis, Mo.

ANCHERS $$$ Outfit—only 12c! Fine triangle stamp; set German stamps with (pre-war) value forty million dollars (interesting!); perforation gauge, mme. scale; small album; airmail set; scarce stamp from smallest republic on earth; newspaper set; packet good stamps from Travancore, Malay, Dutch Indies, etc. Entire outfit for 12c to approval applicants! (Nice pocket stock book, value 25c, with every order!) Ancher Stamp Co., 148½ Clerk St., Jersey City, N. J.

WONDERFUL collection 205 different stamps from Gwalior, Haute-Volta, Kouang-Tcheou, St. Thomas, South Africa (Springbok), and other "hard" countries; fine triangle stamp; package hinges; millometre scale, ruler; copy largest stamp in the world (China "Wild Goose," cat. 40c!!); big illustrated lists. Total Value $4.50. All for 10c! Also approvals. Indian Stamp Co., 103 Howard St., Bangor, Maine.

THE Big Four! New set 6 Greece (beautiful scenes, Corinth canal); new set 3 Turkey (blacksmith and dog); 5 Costa Rica (gov't adv. bag coffee); 4 Iraq (ferrying animals in native boat), regular price 50c. Special to approval applicants 10c. Dennie, 7763 Logan, Detroit, Mich.

FREE—3 fine triangles free with our special packet of 50 different for 8c, together with our large illustrated catalog of U. S. and foreign stamps, sets and packets. 22 Guatemale 8c, 10 Newfoundland 5c, 50 French Colonies 10c, 10 Montenegro 6c, 10 Tunis 5c, 10 Algeria 5c. "Approvals if you ask for them." Inland Company, 6217 Forest ave., Kansas City, Mo.

4 GIRAFFE stamps and packet, 5c to approval applicants. Glenn Smith, Girard, Kans.

FREE. To approval applicants: Two U. S. Dollar stamps with order for 117 different for 10c. Including many obsolete U. S., scarce Airmail and Triangles. The Stamp Mart, 502 Metropolitan Theatre Building, St. Paul, Minn.

SPECIAL Nonduplicating Time Sets:—20 British North America; 30 United States; 22 Latin America; 18 West Indies; 40 Europe; 28 Africa; 16 Japan; 18 India; 18 India States; 22 other Asia; 18 East Indies. All for one dollar. A. Moss, 8949 164 Street, Jamaica, N. Y.

BARGAIN Offer. Wonder packet of 1000 mixed foreign stamps 25c. Arcy, Box 483, Muskogee, Okla.

FREE. Select One. All different. 10 Uruguay, 15 Newfoundland, 10 Iceland, 100 Austria, with McKele's Stamp Weekly, Beverly Mass.; three months 25c.

FREE! True-Blue Book. Exchange stamps, postcards. Erickson, Elroy, Wis.

FINE Premium with Approvals References. Van's Stamp Co., Walla Walla, Wash.

100 VARIETIES, 10c. Bargain packets. Approvals. J. McKee, 1115 Scott, Covington, Ky.

UNITED STATES Stamps, 1847 to 1890, on envelopes. Lists free. NAGY, 8 South 18th, Philadelphia.

50 FRENCH Colonials 7c to approval applicants. Prail, Somerville, N. J.

HIGH-CLASS Approvals. References Required. Pikes Peak Stamp Co., Colorado Springs, Colo.

FREE, 12 Diff. British Colonies for a request for my popular approvals of large showy picture stamps, at 50% Discl. Postage 2c. Chas. Bushnell, 4728 Princeton Ave., Tacony, Phila., Pa.

UNITED STATES—Fifty different, no current issues, 10c, to approval applicants. Big lists free. Fenway Stamp Co., 161 Massachusetts Ave., Boston, Mass.

BEAUTIFUL Picture Stamps Sent Free. Paul Cornish, Schenectady, N. Y.

SPAIN—30 varieties. Postage only, 10c postpaid. Allton, Angola, Ind.

WONDER Packet of 35 different to approval applicants only, sending 4c. Richard P. Lamprecht, Valparaiso, Ind.

BARGAIN—25 British Colonies 25c. Grant, 6317 18th Avenue, Brooklyn.

OUR Latest 20-page U. S. and Canadian price list free. Stanley Gibbons, Inc., 37 Ann St., New York City.

250 DIFFERENT stamps, with free premium, 10c. Skillman, Titusville, N. J.

40 DIFFERENT United States 10c. 60% approvals. Seidenberg, Baroda, Mich.

1000 ALL different, catalogued over $30.00, $3.00. U. S. Mission, 20c per lb. postage extra. Precancelled or stock transfer, 20c per 100. Lists Free. Leckie, 4512 No. Racine, Chicago.

110 NEW Europe All Different, a wonderful collection cataloguing several dollars, free to collectors requesting our Net Approvals. Postage 2 cents. Badger Stamp Co., Milwaukee, Wis.

DANZIG Stamps Free—Interesting packet from Danzig with big catalogs free for 2c. Midland Stamp Company, Toronto, Can.

STAMPS, 100, all different, 3c to approval applicants. Glenn R. Knight, Box 3, Sausalito, Calif.

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FREE! 10 Nyassa or 12 Newfoundland with "Stamp Topics" Magazine six months, 50c. 423 West 42nd, New York.

6 COMPLETE Sets Catalogued $3.34 only 75c!! Weber, Seminary Place, New Brunswick, New Jersey.

OLD New Brunswick and old Canadian stamps included in our wonderful packet of 100 British Colonial stamps, all different. This valuable packet to approval applicants for only 25 cents. Large illustrated price list with many special bargains included with each order. The supply is limited so get yours now. Prospect Stamp Co., 401 Quebec Ave., Toronto 9, Canada.

MOST Sensational values; over 140 diff. Algeria, Airplanes, Azerbaijan, Barbadoes, Cameroun, Babon, Guyane, Irish set, large French Colony packet, largest stamp, 40 year old U. S., gauge, etc., for 10c to approval applicants. List free. 100 diff. U. S. 30c—1,000 hinges 9c—50 Bavaria 9c. Hawkeye Stamp Co., Cedar Rapids, 39, Iowa.

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SURPRISE Packet—Borneo, Australia, Malay, U. S. Commemoratives, Etc., and Illustrated Lists for 6c. Moseley, 4521 Parkview, St. Louis, Mo.

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STAMPS on approval ¼c up. Free Premium. Herbert Keigwin, Middletown, N. Y.

100 FOREIGN postage stamps, 4c; approvals 50% off, references, write for our big bargain lists of packets and sets. Palmer Stamp Co., 8221 Linwood Ave., Detroit, Mich.

24 VARIETIES Cuban stamps, 10 cents. List of 6,000 low-priced stamps free. Address Chambers Stamp Co., 111P, Nassau St., New York City, N. Y.

110 DIFFERENT Stamps, many unused, high values, free to collectors requesting our Net Approvals. Postage 2 cents. Christensen, Milwaukee, Wis.

ONLY 5c! 10 Airmail stamps, including scarce Esthonia triangle; Greece Red Cross set; packet fifty different stamps—all unused—from Guyane, Ubangi, etc. All for 5c! Approvals and free lists with each order. Curhan Stamp Company, Gloucester, Mass.

STAMPS, 100 all different. Postage 2c. Lists free. P. M. Quaker Stamp Co., Toledo, Ohio.

1000 MIXED Foreign Stamps 25c. Phil Lundsted, Cape Cottage, Maine.

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AMAZING Scientific Discovery offers you $15 a day sure. No-Frost keeps auto windshields, show windows, mirrors, eyeglasses, etc., absolutely clear of rain, sleet, snow, frost, mist and steam. Quickly demonstrated. Motorists, bus drivers, motormen, storekeepers, hotels, restaurants, housewives buy on sight. Pocket package—large profits—tremendous field. Write for Special Introductory Offer. No-Frost Co., 1671 Monmouth, Cincinnati, Ohio.

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$18 TO $25 daily. Biggest selling line of 2-piece suits $9.95 and $12.50; 3-piece wool suit, $17.95 (regular $28.00 value). All-wool overcoat, $18.50. Splendid raincoats, slickers and boys' suits. Biggest commissions. Free outfits. "Jim" Foster, Inc., Dept. 22, 2250 S. Spaulding Ave., Chicago, Ill.

MAKE $2.00 Every Hour. Sell every home wonderful preparation; mends hosiery and clothing without sewing, invisible. Results guaranteed. Send for free sample of work. Queen City Laboratories, Dept. PM-2, Cincinnati, Ohio.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 138 and 139.

MAKE $120 Weekly. No experience necessary. Take orders for Camden Suits—tailored to measure, $28.75. Extra pants Free. Pure wool fabrics, wonderful tailoring. Your profit $4.50 in advance. Satisfaction guaranteed or money back. Spring Outfit Free. Send for it today. Camden Clothes, Inc., Dept. B-13, 317 S. Market, Chicago.

WE Pay $48 a Week, furnish auto and expenses to introduce our Soap and Washing Powder. Buss-Beach Co., Dept. A42, Chippewa Falls, Wis.

MAKE $50 to $75 a Week. Everyone needs shoes. Sell Mason's all-leather shoes, amazingly low prices. 85 styles—men's, women's, children's. No experience needed. Big outfit Free. Mason Shoe Mfg. Co., Dept. 222, Chippewa Falls, Wis.

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WHY work for others? Employ agents yourself. Make your own products. Toilet Articles, Household Specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

AGENTS—Sell stores 5c candy Specialties. Lorrac Products, Albany, N. Y.

NEW Aluminum Window Ventilator, rustproof and enduring. Hall, Medford, Mass., sold 17 first day. Profit $11. You can do same. Sample prepaid $1; refunded first order. Particulars. A. Condon, 12 Pearl St., Boston, Mass.

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AGENTS: Big season on. No competition. $10.00-$15.00 daily. Rhinestone Initial Buckles, etc., sell on sight. No investment. Chaton Co., 606 Blue Island, Chicago.

"WHERE to buy half million articles Wholesale." 72-page directory offers unlimited opportunities for agents. Free particulars. Pruitt System, Brookfield, Ill.

$10 EVERY Day. Will send sample of new Wringer Mop with Big Steel Plate on approval. Convince yourself at our risk. Kleanezy, Dept. G-16, Delphos, O.

FLAVORING Extracts—Bottle Yourself! Concentrated—add water! Free labels, whirlwind sellers! 500% Profit! Money-making opportunity. Write Thomas Manufacturing Company, Indianapolis, Ind.

PLAID Slickers and hat $2.98. Also New Aerotex and Hidelike coats. Outfit Free. American Waterproof, 724P Roosevelt, Chicago.

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CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 36.

AGENTS to sell rebuilt watches; solicit watch repairs. International, Box 5P, Fordham Station, New York.

AGENTS $300 month. Sell guaranteed silk hosiery. Must wear 7 months or replaced. New Selling plan. We furnish auto. Free silk hosiery for your own use. Write for samples. Betterknit Textile Co., Silk, 1831, Greenfield, Ohio.

100 MORE active men to Introduce "Chieftain" Guaranteed Tailored Shirts, 3 for $4.95. Latest novelties, colors, styles. Dickman, Illinois, in 3 weeks made $589; Sinton, Texas, in 12 days, $219.60; Bend, Iowa, in 16 days, $334.80. Why not you? No experience or capital needed. We deliver and collect. Full working outfit free. Cincinnati Shirt Company, Shop 1582, Cincinnati, Ohio.

AGENTS:—Big commissions and bonuses taking orders for our big line of fashionable Dress Fabrics, Handkerchiefs, quality Hosiery, fancy Scarfs, Linens, etc. 1000 Samples furnished. The National Importing Co., Dept. B-100A, 573 Broadway, New York, N. Y.

BRING Home the Bacon! Selling Christy's Polishing Cloth. Polishes all metals in a jiffy. Easy to demonstrate. Everybody buys. Unusually handsome profit. Write for free sample. Christy, Inc., 5767 B'way, Newark, New York.

AGENTS make $100 week furnishing Cigar Lighters to merchants on free advertising plan. Particulars sent free, write at once. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

FREE Sample, "Rain Shield Wiper." Retails $1.00—Cost (25 cents). Sold Clear and Rainy Days. No Cloth—No Paste—No Attachment. (1) Rub keeps windshield clear 48 hours. Experience Unnecessary. NuLife Corporation, Hartford, Conn.

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PORTRAIT Agents—Write for new Catalogue—Enlargements, Frames, Medallions, Sheet Pictures, Luminous Crucifixes. Adam J. Kroll & Co., 2539 So. State St., Chicago, Ill.

WANT Distributing Agent for Handslick, powdered hand soap; removes anything from hands; everybody a customer; sample free. Solar Products Co., J-2142 S. Troy, Chicago.

OUR Luminous Crucifix Shines in the Dark. Every one amazed at the wonderful effect. Easily demonstrated. Easily sold. W. G. Hannan Co., Dept. B, 2539 So. State St., Chicago.

AGENTS—Big Money! Sell dress goods. Wholesale prices. Highest commissions—Bonus. Full—spare time. North American Importing Co., 1123 Broadway, Dept. A2, New York.

"POLISH-CLOTH" cleans all metals without liquid, paste, powder. Great Seller—sample free. Schrieber, Nashville, Ill.

KEEP all profits. Any desired formula $1.00, guaranteed. Central Laboratories, 233P, Champaign, Ill.

AGENTS Wanted to sell Men's Hats direct from factory. Write for catalog. Model Hat Mfg. Co., Dept M-14, East Orange, N. J.

AGENTS make your own products. 5 commercial formulas, $1. R. G. Wilborn, Box 344, Mineral Wells, Texas.

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32 SECONDS complete tire change by Detmer, Ohio, with Morey Quick Action Rim Tool. Sold, singly, 49 three days, cleared $100. Anderson, Mont., sold 1400 in 14 weeks. Get details for good territory. Harvest time Now. M. Morey Rim Tool, Buffalo, N. Y.

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GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 2480, St. Louis.

TO take orders. Write Red Ball Company, Osceola, Iowa.

FURNITURE Refinishing, Polishing, painting, handyman shop; wonderful profits; start yours on nearly nothing. John Braceland, 1457 So. Ninth, Philadelphia, Pa.

AGENTS—Big Seller — $20 Daily Easy selling Taylor Caps — made-to-measure — every man buys—some want 2 or 3 caps. Outfit free and Cap free to agents. Write quick for fast money-making proposition. Taylor Cap Manufacturers, Dept. E-13, Cincinnati, Ohio.

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$50,000. PICTURE Man Friedman made canvassing. Beginners can make $100.00 weekly with my sales talk. Experienced men make more. Free book. "Profits in Portraits" explains. Sample Free. Picture Man Friedman, Dept. 8-D, 541 W. Lake, Chicago.

AGENTS—Make two dollars hourly. Sell new kind of Sharpeners. Sharpens all knives, tools, quickly. Demonstrating sample free. Premier Mfg. Company, Dept. 64, Detroit, Mich.

JUST Out — New Patented Apron. No strings or straps—$20.00 a day every day; over 100% profit; commissions daily. Write for free offer. Sta-Put Co., Dept. 202, St. Louis, Mo.

NO difference what you're selling, you can increase your sales 500% by giving our $1000 policies as free premiums. Costs you nothing. Name your line and write. United States General Underwriter, B501, Willow Hill, Ill.

AGENTS—Make $3.00 an Hour Taking Orders for our 40 fascinating kitchen specialties. No competition. Write quick. General Products Co., Dept. B-207, Newark, N. J.

$100.00 WEEKLY! Two Suits or Suit and Topcoat $33.50. Wool materials. Made to measure. Commission $6.00-$8.00. Outfit free. Garfield Tailors, H1557 Milwaukee, Chicago.

NEW Invention—400% profit. Liquid quick mend for Fabrics and Hosiery. Stops runs. Every woman buys. Hundreds other fast sellers. J. E. Johnson Co., Dept. 462, 6129 Wentworth Ave., Chicago.

MAKE big money. Be the Electrical Dealer in your town. Sell a big line of low priced, quality appliances. Write for our selling plan. Dandyline Products, 4420 N. Western Ave., Chicago, Ill.

AGENTS—Amazing New Discovery, saves silk, prevents runs. Selling like wildfire. Particulars, stamp. J. C. Pierce, 1504 Hastings, Detroit, Mich.

SELL Men's Fine Suits (extra trousers free) for $16.95. $90.00 a week for you. Also tailored pants, $3.95 ($5.00 value). Big extra commissions. Both sample outfits free if you write quick. Tru-Fit, 808-A Broadway, Dept. B-10, New York.

AGENTS—Mosco Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Co., 396 Searle Bldg., Rochester, N. Y.

SILK Dresses. Our expensive showroom samples. (Slightly handled.) Cheap. Dress dealers, peddlers, dressmakers, write Hirschlar's Dress Bargain House, 249 W. 34th St., New York.

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FREE Information Chart. Sell little novelties by mail evenings. Beginner's Outfit furnished. Hadwil, 97A-74 Cortlandt Street, N. Y.

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SHOE Laces, factory prices. Samples 10c. Braidline Mfg. Co., 2516 Archer, Chicago, Ill.

MAKE $50 a Week in spare time. Large laboratory offers free instructions to intelligent, ambitious men, explaining how to build profitable, independent proprietary business from home by mail. No investment. No scheme. Sound, simple tested method, now constant in use. Apply to Cross Co., 93 Nassau St., New York. Mail Div. P. M.

GET This. $1.00 auto necessity. 100% Profit. Repeats like gasoline. Guaranteed. Taylor Products-Mfg. Co., Columbus, Ohio.

SEND name, address on postcard. Free introductory copy Modern Salesology Magazine; 1000 money-making opportunities offered by big reliable firms; no obligation. Salesology Magazine, Desk B-38, 500 No. Dearborn, Chicago.

MAKE $100 weekly selling better-quality, all-wool, tailored-to-measure suits at $23.50 and $31.50. Highest commissions. Extra bonus for producers. Over 100 6x9 swatch samples furnished. Write today. W. Z. Gibson, Inc., 500 Throop St., Dept. P-517, Chicago.

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MAKE $45 and Up Weekly. Brand new plan. Profits paid in advance. Free suit to each agent. Just show our wonderful new style outfit and take orders for our high-grade tailoring. Handsome carrying case outfit of large real cloth samples—everything furnished free. Spencer Mead Company, Harrison and Throop Sts., Dept. P-817, Chicago.

MIRRORS Resilvered at Home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating autoparts, reflectors, tableware, stoves. Refinishing metalware, etc. Outfits furnished. Details free. Write Sprinkle, Plater, 128 Marion, Ind.

$5.00 SELLING Outfit Loaned Free! Make $10 daily easily demonstrating amazing new and entirely different Wringer Mop and Dust Mop. Housewives eagerly buying. We deliver and collect. Get handsome outfit immediately. No money required. Write Delphos Mop Co., 1012C Washington, Delphos, Ohio.

DON'T take a chance with rain, snow or sleet on your windshield. Use Rainshed No. 1 for fog and rain, 35c post pd. Use Rainshed No. 2 for snow and sleet, 50c post pd. Guaranteed to do the work or money refunded. Does not harm paint. Dealers wanted. Big money. Season just opening. Manufactured and sold by Julius Rumpel, Weston, Mo.

SEMI-Automatic adjustable black walnut cracker, eliminates nutpick; $7.50 prepaid; agents wanted. Clarck Nuts Kracker, Harrisburg, Pa.

WE sell the improved Roco circulating pump, also Strainer Check Valve. Agents wanted. C. A. Smith Co., 100 Central St., Milford, Mass.

AGENTS: Newest sensation—Rhinestone Initial Fountain Pens. Everybody wants one. No competition. $8.00—$15.00 daily in advance. Chaton Novelty Co., 602 Blue Island, Chicago.

AGENTS! Men and women make big money—taking orders for our beautiful Dress Goods, Silks, Wash Fabrics, Handkerchiefs, Hosiery. Fancy Goods. 1000 Samples furnished. The National Importing Co., Dept. B-100, 573 Broadway, New York.

OH Hello! Why Didn't I See This Before? Christy's Iron Rust and Stain Remover sells like blazes. Write for free sample. Christy, Inc., 5007 B'way, Newark, New York.

WHY work for others? Employ agents yourself. Make your own Products. Toilet Articles, Household Specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

ONCE In a Blue Moon comes chance like this. Pick up $5.40 for a few moments work. Then, if you like, become regular representative making $10.00-$15.00 daily. Big established company. Big line. Big Business. Write quick. Pitkin Laboratories, 156 Pitkin Bldg., Newark, New York.

"MAKE Big money selling our patented exclusive household novelty. Every housewife a prospect. Send 60 cents for sample and information. C. Solomon, Jr., 314 Battery St., San Francisco.

PICTURED Sign Cards. 400% Profit. Sample free. Brenneman, Lima, Ohio.

AGENTS Wanted. American elevating wall clothes drier, and handy wall rack. Two good sellers wanted in every home. Write Frank Hopkins Co., North Girard, Pa.

AGENTS, Salesmen, Pitchmen, Look! Men's Hosiery, Fancy Hosiery imperfects. $13.20 Gross Pairs, Rayon silk $10.80 Gross Pairs. Send $25.00 for the above two gross Pairs. Postpaid. Lewis Hosiery Co., 12 N. 3rd Street, Philadelphia, Pa.

AGENTS—Best seller; Jem Rubber Repair for tires and tubes; supersedes vulcanization at a saving of over 800 per cent.; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 505.

DO you want good live agents—fellows who can get the business? Ask me how others are doing it. I'll gladly render the necessary assistance without cost to you. Address, M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

REPRESENTATIVES wanted by over 500 manufacturers, offering real money-making propositions. No need of being out of work. Write for Free copy, Opportunity Magazine, 750 N. Michigan, Service Dept., Desk J-2, Chicago.

SEND 25 cents for a one dollar Cigar Lighter, and learn how to make $10 a day. Particulars free. Rapid Mfg. Co., 799-T Broadway, New York City.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

MONOGRAM Automobiles, $1.35 Profit ten minutes' work; every owner wants them; millions without; particulars free. Motorists Accessories Co., Man field, Ohio.

AGENTS, sell home altars, sick-call outfits in Catholic homes. Demeo, 114 Ford St., Providence, R. I.

"LATEST from Japan," a real side-line for a-one man. Write, P. Fonos, Distributor, New Richmond, Wis.

REPLATE Brassy worn-off Automobile Parts, Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. $1.00 half pints. Post Paid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

REMNANT Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

$50.00 WEEKLY easy. Applying Gold initials on Automobiles. No experience needed. $1.45 profit every $1.50 job. Free samples. "Ralco Monograms," X1043 Washington, Boston, Mass.

CHAMOIS-RAY All-Metal Polisher, $1,000.00 reward—200% profit. Particulars free. Le Soleil Company, 2841 N. Racine, Chicago.

HERE It Is—newly invented auto necessity that goes big with New Ford; particulars free. Suburban Box 10, Mt. Washington, Ohio.

400% PROFIT Enormous Demand Washes Clothes without Rubbing or Boiling. Sample Free. Utility Mfg. Co., Chippewa Falls, Wis.

WE Pay $160 monthly salary and expenses to introduce to farmers our guaranteed poultry and stock powders. Bigler Co., F25 Springfield, Ill.

ARE You Old at Forty? See our advertisement on page 88 of this issue. The Electro Thermal Company, 2102 Morris Ave., Steubenville, Ohio.

AGENTS Send for free sample "Fretnot." Washes clothes snow white without rubbing. $5.00 daily and more easily made. Credit given. Empire, 1549 N. Wells, Dept. 101, Chicago.

WE Have the finest needle case, self-threading needles, needle threaders. $50.00 to $200.00 weekly. Samples 25c, particulars free. Empire, 1549 N. Wells, Dept. 201, Chicago.

SELL your own goods. Make larger profits. Twelve tested formulas free. W. Murphy, 273 Dean, Brooklyn, N. Y.

PREPARED Shoe-Shining Mit. Just Invented. (No Polish Required.) Treated Felt Side Cleans, Polishes. Prepared Side Preserves, Waterproofs. Retails (25c)—Costs (8c). Customers Advertisement if desired. (Sample 15c.) NuLife Shine, Hartford, Conn.

OHKAY Wonder Herbs, money-maker. Sample free. Osman, 1728—7th St., N. W., Wash., D. C.

COMMON sense selects the New B. & G. Line to make the Dollars. Three staple lines combined to make a sale in every home; a big profit on every sale. Write B. & G., Mfg. Co., Dept. 311, Pittsburgh, Pa.

WHY work for others? Employ agents yourself. Make your own products. Toilet Articles, Household Specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

$1,000.00 REWARD if this is not the greatest money-making house to house proposition ever known. N. R. G. tablets wash clothes in 10 minutes without rubbing. Free Samples. N. R. G. Co., H232 W. Superior, Chicago.

SHOW Us the housekeeper who likes to clean stair corners. Earn big money installing Ideal Corner Dust Shields. Write today. Ideal Stairway Equipment Co., Canton, Ohio.

$75 WEEKLY. Man or woman wanted with ambition and industry, to distribute Rawleigh's Household Products to steady users. Fine openings near you. We train and help you so you can make up to $100 a week or more. No experience necessary. Pleasant, profitable, dignified work. Write today. W. T. Rawleigh Co., Dept. 53PPM, Freeport, Ill.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large Profits. Enormous Demand. Free Samples. Write today. Metallic Letter Co., 428-D North Clark, Chicago.

SUCCEED With Your Own Products. Make them yourself. Formulas, Processes, Trade-Secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

WE Trust You!—Starter stock and reorders on credit—no bond signers; Finest line 200 guaranteed Extracts, Pure Foods, Toiletries. Big Profits. Write for details. Perkins Products, E-3, Hastings, Nebr.

AGENTS Making Big Money Selling Fibre Brooms, Push Brooms, Dust Mops, Auto Mitten Dusters. Catalog and Samples Free. National Fibre Broom Co., St. Louis, Mo.

AGENTS, Men, Women, My Comb Cleaner and Needle Specialties sell easy. Good Profits. Particulars, P. Miller, Box 3, Tremont Station, New York City.

AGENTS—Make $10 daily; engraved name plates, signs, numbers, etc. Brett Bros., Roxbury Crossing, Boston, Mass.

GOLD-LEAF Sign Letters; copyrighted Manufacturing Instructions; profits 1,000%. Johnston Co., Quincy, Ill.

JIFFEX—Pays all profit! Invest $1.00, make $20.00. Enclose $1.00 bill, receive charges prepaid Jiffex for 10 gallons (80 pints) earning you $20. Jiffex Amazing Glass Cleaner, cleans, polishes windows, windshields, showcases without water, soap or chamois. Wonderful demonstrator. Everybody buys on sight! Receive also many other agent's profitable paying propositions. Satisfaction guaranteed. Miller, Chemist, 1706-F Jetton, Tampa, Fla.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

BIG Money for men and women selling wonderful Whitehouse Stove Polish, Devil Dog, Walnut Flavoring, Beauty Creations, etc. Write quick. Blair Laboratories, Lynchburg, Va.

WE pay $50 a week and expenses and give Ford Auto to men to introduce poultry and stock compounds. Imperial Co., D23, Parsons, Kan.

AGENTS—We start you in business and help you succeed. No capital or experience needed. Spare or full time. You can earn $50-$100 weekly. Write Madison Company, 566 Broadway, New York.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

POLMET—The Wonderful Polishing Cloth that cleans all metals without liquid, paste or powder. Approved by "Good Housekeeping" and "Modern Priscilla"—sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

NO Dull Times Selling Food. People must eat. Federal distributors make big money; $3,000 yearly and up. No capital or experience needed; guaranteed sales; unsold goods may be returned. We furnish you with sample case, license and Free Samples for customers—Sure repeat orders. Exclusive territory. Ask now! Federal Pure Food Co., A2307 Archer, Chicago.

AUTO owner tire agent wanted each locality to use and take orders for hand made Mellinger cord and balloon tires; guarantee bond 15,000 miles; shipped prepaid on approval; get your tires free; no capital or experience required; make $100 to $300 weekly. Write for wholesale prices and sample kit. Address Mellinger Tire Co., Dept. 400, Kansas City, Mo., or Dept. 400, Philadelphia, Pa., or Dept. 400, Oakland, Calif.

REAL Whirlwind Seller—Nopulout Custom Shirt. Every man buys them. Patented—no competition. Liberal commission. Free selling kit. Make $15 up daily taking orders direct from consumer at manufacturer's prices. District or local agents. Write Nopulout Shirt Co., Dept Y, Hazleton, Pa.

PHOTO Medallion Men and Women, the largest line of Photo Novelties in the world. Lowest prices, quickest service. Send for catalogue showing over 200 money makers. Photo medallions, photo medallion clocks, photo mirrors, photo fountain pens, photo powder compacts, photo jewelry and photo buttons. Gibson Photo Jewelry Co., 608-614 Gravesend Ave., Brooklyn, N. Y.

AGENTS: 500% profit. "Happy Home Make Shampoo" builds your own big business. Martin of Indiana made $75.00 in one day. Missouri man made $750.00 one month. Exclusive territory. Geo. A. Schmidt & Co., Dept. P, 236 W. North Ave., Chicago.

SOMETHING New. Every motorist a buyer of our electro-magnetic-emergency Wonderlamp; takes only one minute to demonstrate and make a sale; no experience necessary; $5.00 an hour easily made; full time or evenings. Write for sample. Wonderlamp Co., 926 Fisk Bldg., Dept. 10-A, New York.

CALIFORNIA perfumed beads selling like hot cakes. Agents coining money. Big profits. Catalog free. Mission Factory P, 2328 W. Pico, Los Angeles, Calif.

ARVEO Polishing Cloths offer big profits to salesmen. Sample and particulars free. Arveo Industries, Box F 147, Grosse Ile, Mich.

AGENTS make $10.00 Daily selling Non-Splash Water Filters on sight. Best canvasser's article on market. Investigate. Write for particulars, Desk 14, Seed Filter Company, 73 Franklin Street, New York.

FIBRE Brooms—detachable handles, fine finish. Good profits, repeat sales. The Fibre Broom People, 147-C New Jersey Ave., Brooklyn, N. Y.

EARN $10 daily silvering mirrors, plating, refinishing metalware, chandeliers, headlights, bedsteads. E. Decie Laboratories, 225 Varick St., New York.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-U West VanBuren, Chicago.

LAMB'SWOOL Polishing Mittens, Brushes. Newhall, 358 Broad, Lynn, Mass.

AUTOMOBILE Specialties. Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tujunga, Calif.

BIG profits distributing 5c candy specialties to dealers. Fast sellers. Exclusive territory. Universal Sales Company, 631-B Wilson Ave., Brooklyn, N. Y.

WHY work for others? Employ agents yourself. Make your own products. Toilet Articles, Household Specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

SELL men's neckwear; wonderful proposition. Astor, 318-M Broadway, New York.

MAKE Startling Big Profits Collecting Money—Amazing New Plan Pays Men $50 to $85 a Week Year After Year! Full or Spare Time. Make Money While You Sleep. Build a big Lifelong Business. Tartaroff Co., Dept. 13-B, 1306 W. 74th St., Chicago.

AGENTS become a regular established McConnon dealer; buy on credit; sell for cash or credit. 228 absolute household necessities; all repeaters. Enjoy a sure income 52 weeks per year, year after year. City or country trade. Capital, experience unnecessary. McConnon & Co., Dept. S-49, Winona, Minn.

IF I Send You a Suit made in latest style from finest goods, will you wear it and show it to your friends as a sample of my sensational values? Could you use $3.00 an hour for a little spare time? If so, write at once for my wonderful new proposition. Address Sales Manager, 133 South Peoria, Dept. 11, Chicago.

THE Season's fastest sellers, Shirts, Underwear, Sweaters, Pants, Boys' Suits, Men's Overcoats, House Dresses, Hosiery, Bedspreads. May Company, Pancoe Bldg., Chicago.

LATEST Imported Novelty! Sell French art mirrors. Small cost. Everybody buys. Particulars and sample mirror 25c. World Service Co., 336 Marcy Ave., Brooklyn, N. Y.

WRITE Atlas Sign Works for free working equipment. Beautiful window sign letters. Penny each! Any size. Wonderful offer to general agents. K1032 E. 55th St., Chicago.

AGENTS $72 a week—take orders for Guaranteed Cutlery, Knives, Razors, etc. Big commission. Exclusive territory. Big money for spare time. Write quick. Novelty Cutlery Co., Desk 1031, Canton, Ohio.

CHECK protection experts make $120 weekly with ease. Free training now offered for this fascinating new profession. New checkwriter equals any machine on market at fraction of cost. Merchants, professional men, business men buy at sight. Permanent, dignified position. Write quick for details and special offer. Arnold Check Writer Co., Dept. B-14, Flint, Mich.

$8.75 AN hour; that's exactly what Ride Air men make every hour they work. No selling experience necessary. Write for full particulars and free sample today. C. F. Hamilton, Dept. C, 530 West 27th St., Los Angeles, Calif.

AGENTS—Just Out! $8.88 for Men's Suits! Anyone Can Sell! Commission $3 in Advance! Free Sales Kit! 888 Company, Dept. BC-7, Fort Wayne, Ind.

AGENTS—Sell Wonderful Pocket Adding Machine. $7.50 retail. $2.50 to you. Typewriter Supply, 102 Hersch Bldg., Pittsburgh, Pa.

AGENTS $240 month. Dri-Klean-it removes dirt, grease, tar, all one operation. Cleans car for 10c. No soap or water used. Car looks like new. Wonderful seller. Free sample. American Accessories Co., Desk 2031, Cincinnati, Ohio.

NO peddling. Start own business. Home, Office. Big profits. Particulars free. Elite, 38 Elizabeth St., N. Y.

AGENTS—$75 week, up. Sell our new complete line Cigar lighters. Big winner, fast sellers. Full or part time. Write today. Sample 25c. Elbee Trading Co., 709A Broadway, New York.

MAKE $25.00 daily selling colored Raincoats and Slickers, Red, Blue, Green, Etc., $2.95—Hat Free. Commissions daily. Outfit free. Elliott Bradley, 230 So. Wells, Dept. AB2, Chicago.

LEATHERETTES — Jackets — Slickers — Raincoats. Lowest prices, largest commissions. Bonus. Outfit free. Sample on trial. Hamilton Raincoats, 4111RP Gladys, Chicago.

HIGH-GRADE SALESMEN WANTED

SALESMEN Make $10 a Day selling our Business Record and Income Tax Report Book. Indispensable for merchants. Complete record of the year's business. Sell one to every merchant. 100% profit on every sale. Fine side line. Protected territory. No investment necessary for samples. Pershing & Company, Dept. F, South Bend, Ind.

PUNCHBOARD and Sideline Salesmen: New Catalogue of sure selling assortments. New startling Candy Punch Ball Machine. Combination worth $180 weekly. Ad-Lee, 823 Wabash, Chicago.

MAKE $25.00 daily selling colored Raincoats and Slickers, Red, Blue, Green, Etc., $2.95—Hat Free. Commissions daily. Outfit free. Elliott Bradley, 230 So. Wells, Dept. AB2S, Chicago.

SALESMEN—Become Independent, own your business; experience unnecessary selling our $7500 Accidental Death; $50 Accident; $25 Sick Weekly Benefits—$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. $250,000 deposited Insurance Department. Universal Policy, Dept. A, 40 Clinton St., Newark, N. J.

EARN $20 a Day. Establish income for life selling for $1 a year, $1,500 accident policy. Write W. C. Stone, 11 So. LaSalle, Chicago.

EASY to sell groceries and auto oils from samples to consumers. Steady profitable work. No capital or experience necessary. Commission advanced. Liberal credit. Lowerin & Browne Co., Wholesale Grocers, M1500 So. State, Chicago.

AMERICA'S Greatest Tailoring Line Free. 130 large Swatch Samples — All Wool — Tailored-to-Order—Union Made—sensational low price. Get outfit at once. Address Dept. 330, Goodwear, 844 Adams, Chicago.

MEN — sell dependable shrubbery, fruit trees, etc. Steady demand. Complete cooperation. Commissions paid weekly. We deliver and collect. Write Perry Nurseries, Dept. R-2, Rochester, N. Y.

BIG Season Just Ahead. Advertising pencils most popular every day—every business prospect. Our line repeats. Big commissions. Established in 1902. North American Pencil Works, 126 So. Clinton, Dept. 55-H, Chicago.

WONDERFUL Invention Seals Fifty Envelopes minute. Sells on sight at $3.50. Exclusive territory. Kendall Sealer Co., D20, East Jaffrey, N. H.

UNIVERSAL Kitchen Tongs. Sells to Merchants. Popular Household Advertising Specialty. Dandy Sideline. Pocket Samples. Newton Mfg. Co., Bin P, Newton, Iowa.

COLLECT and Keep $6.00 commission each sale. 2 suits or suit and topcoat $27.95. Unusual qualities. Satisfaction guaranteed. Latest patterns. Extra Large, outfit free. Deal Direct. LaSalle Gold Seal Clothes, 527 Broadway, Dept. 30, New York City.

TO Market 3A garage door holders, simple automatic action, quickly installed, instantly attracts garage owners, builders, dealers. Write for exclusive territory proposition. Knowlson-Stevenson Co., 1118 Packard, Ann Arbor, Mich.

SELL Printing. Big Commissions. Outfit Free. Atlas, 2622-G East Tenth, Indianapolis, Ind.

WHY work for others? Employ agents yourself. Make your own Products. Toilet Articles, Household Specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

A PAYING Proposition Open to representative of character. Take orders shoes-hosiery direct to wearer. Good income. Permanent. Write now for free book "Getting Ahead." Tanners Shoe Mfg. Co., 35-2 C St., Boston, Mass.

TOOL Salesmen—Sell to auto mechanics, guaranteed line of 120 Oldforge tools—wrenches, pliers, chisels, screw drivers, punches, tool boxes. Exclusive territory. Give complete information about yourself, first letter. Quality Tools Corporation, New Wilmington, Pa.

PUNCHBOARD Salesmen. $150 weekly, selling new double profit deals from catalog. 100% prospects. 90% Sales. Exclusive territory. Repeat Commissions. Rudy Sales, 1652 Division, Chicago.

WALKER Made $165.00 First Day selling Collection System to Doctors and Merchants. Retails $6.50. Collects $65.00, Costs $1.50. Adjustment Bureau, Mobile, Ala.

RADIATOR Overflow and water-level indicator for automobiles. Salesmen and Agents wanted. 50% commission. The Rad-O-Flo Co., Dept. P, 406 S. Main St., Los Angeles, Calif.

SALESMEN; Newest in blotters; Patented; sells cheaper. 30% commission. Free advertising copy. Slogan Advertising Agency, Norristown, Pa.

SEND name, address on postcard. Free introductory copy Modern Salesology Magazine; 1000 money-making opportunities offered by big reliable firms; no obligation. Salesology Magazine, Desk B-39, 500 No. Dearborn, Chicago.

SIDELINE Men—Commissions paid every two weeks on orders for duplicating and triplicating salesbooks. Every business a prospect. Complete samples free. Competing prices. Kansas City Salesbook, 1003 Walnut, Kansas City, Mo.

SALESMEN for line of five auto necessities. Something for every driver. Easy Sales, Big Profits. Write for territory proposition. Erwin & Waterman, 130 Latrobe Ave., Chicago, Ill.

TAILORING Salesmen: Selling Simpson's new $23.50 pure virgin-wool suits, topcoats; commission in advance; exclusive territory; big outfit 175 samples free. J. B. Simpson, 843 Adams, Dpt. 1468, Chicago.

NO high-pressure salesmanship necessary selling Luminate, our Magic Electric Window and Outdoor Salesman. Demand established. Color, light, motion gets 'em. Greatest quick-change letter system and snappy two-color posters land orders on demonstration. Hustlers collecting $100 weekly, easy. Protected territory. Display Products Co., A407-9 East 31st St., Kansas City, Mo.

PUNCHBOARD Salesmen. 2 hours daily, $100 every week. New line. Lowest prices. Full commission on repeat business. Catalog free. Puritan Novelty Co., 1409 Jackson, Chicago.

ANTIFREEZE prevents radiators freezing. Dricleen, the combined auto cleaner, polisher. Radiator, internal cleaner. Hand soap. Write for free shipment long-profit auto specialties. Mickman Co., St. Paul, Minn.

EARN $10 daily silvering mirrors, plating, refinishing metalware, chandeliers, headlights, bedsteads. E. Decie Laboratories, 225 Varick St., New York.

TRAVELING Salesmen Calling on Retail Stores wanted by large manufacturer of fast-selling specialties entirely different from the average. Year-round sales, main or sideline. Big commission paid immediately on original and repeat business. Opportunity for well paid and permanent connection with old-established firm. If not making $150 weekly, write today. Union Specialty Works. Dept. 222, Boonville, N. Y.

40% COMMISSION selling printed business stationery at knock-out prices. Part or full time. Free outfit. L Process Service, Minneapolis, Minn.

COLLECTS Money from the Dead-Beats. Retails—$5.00. Cost—$1.00. Profit $4.00. "New Method." Every Storekeeper, Doctor buys quickly. Wonderful Money Getter. Federal Association, Hartford, Conn.

WERE You Ever Offered a Grocery Store? Our proposition is letter. Let us tell you how you can handle groceries, auto oil, tires and paint. No rent, no investment in goods. Big pay. Write. Just say, "Show me." Hitchcock Hill Co., Wholesale Grocers, 38 Kinzie, Dept. 50, Chicago.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-V West Van Buren, Chicago.

DISTRICT Salesmen—All wool, union made suits, overcoats, $23.50. Liberal advance commission, bonus. Write for expensive free outfit. Harvey Bros., Dept. 555, Box 00, Chicago, Ill.

SALESMEN—Four $15.00 sales to merchants net you $40.00 daily. Sayers Systems, 2813 Sheffield, Chicago, Ill.

SIDELINE Salesmen calling on Mines, Mills and Factories. Commissions paid on original and repeat business. Pittsburgh Insulating Company, Pittsburgh, Penna.

ANY Salesmen Can Sell Them! Merchants everywhere use punchboards. Someone sells them, why not you? Collect big commissions daily. Newest, largest, elaborate catalog sent upon request. Lincoln Sales Co., 9 So. Clinton, Chicago. Dept. D.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

HELP WANTED

WHY not sell us your spare time? $2.00 an hour. $19.70 daily easy full time. Introduce 12 months' Guaranteed Hosiery—47 styles, 39 colors for men, women, children, including latest "Silk to the Top" Ladies' Hose and Men's Fancies. No capital or experience needed. We furnish samples. Silk hose for your own use free. New Plan. Macochee Hosiery Company, Park 2602, Cincinnati, Ohio.

MAKE $25.00 daily selling colored Raincoats and Slickers, Red, Blue, Green, Etc., $2.95—Hat Free. Commissions daily. Outfit free. Elliott Bradley, 230 So. Wells, Dept. AB2-M, Chicago.

YOU Are Wanted to Re-Silver Mirrors at Home. Immense profits plating autoparts, tableware, etc. Write for information. Sprinkle, Plater, 287, Marion, Ind.

REPRESENTATIVES wanted by over 500 manufacturers, offering real money-making propositions. No need of being out of work. Write for Free copy. Opportunity Magazine, 750 N. Michigan, Service Dept., Desk J-3, Chicago.

SALESLADIES Earn $7-$15 Daily. Spare time. Demonstrate children's and ladies' dresses and lingerie. Experience unnecessary. Free dress to producers. Nothing to buy. Janalene, Inc., Dept. 206A2, Indianapolis, Ind.

MR. BRUSH Salesmen—Old Established New York Brush Manufacturers require services of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commission than any other Brush House in the country. Write immediately for proposition. Wire Grip Sanitary Brush Corporation, 15 Mercer Street, New York.

WE Start You in Business, furnishing everything; men and women, $35.00 to $100.00 weekly operating our "New System Specialty Candy Factories." Few dollars start you home or small room anywhere. Booklet free. W. Hillyer Ragsdale, Drawer 350, East Orange, N. J.

SEND name, address on postcard. Free introductory copy Modern Salesology Magazine; 1000 money-making opportunities offered by big reliable firms; no obligation. Salesology Magazine, Desk B-40, 500 No. Dearborn, Chicago.

HOW to sell your ability and experience—Former Employment Manager for Nationally known corporations explains the three ways to sell your services—tells exactly what to do—how to do it—how he can help you. For free descriptive folder, address Box 479, South Norwalk, Conn.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 36.

GET employment with machinery, tractor or thresher company. Complete particulars with list $1.00. Arthur Underdahl, Austin, Minn.

OBTAIN Employment! 70 Jobs offered one person! Get positions you want, quickly, anywhere. Complete information 50 Cents. Money promptly returned if wanted. Better Yourself! New Idea Service, Box 39-A, Station K, New York.

EXPERIMENT with Lambert Long Distance Crystal Radio. Only cost $2.95. Will pay cash for any improvements accepted. Write Experimental Department, Lambert Manufacturing Company, Wichita, Kansas.

FOREIGN Work—Young men interested in working in romantic South America write at once for information. South American Service Bureau, 14,600 Alma, Detroit, Mich.

ARE You Old at Forty? See our advertisement on page 88 of this issue. The Electro Thermal Company, 2102 Morris Ave., Steubenville, Ohio.

MAILING LISTS

99% GUARANTEED Mailing lists. Accurate. Reliable. Guaranteed. The kind that produces business; compiled for every possible business or individual. Lists of every kind of any business or individuals compiled for your individual needs any where. Catalog and information on request. National List, 847 Broad, Newark, N. J.

500 RECENT Lady Buyers, $2.00. Guaranteed Correct, PM-1, 411 N. Poplar, Charlotte, N. C.

JUST come in—Leads of mail order buyers and agents. 25c hundred. National Mailing Service, 6135 Chabot, Oakland, Calif.

MAILING list 99 percent good, up to date. Diamond Spec. Co., 585 Wentworth Ave., Chicago.

1,000 1927 RURAL women's names, $1.00. Sheasgreen, PM1427 North Penn, Minneapolis, Minn.

BUSINESS SERVICE

DETROIT, mailing address $2 month. Wolverine Business Service, 9698. Grand River.

MAIL address. Quick forwarding service. Just outside Philadelphia. State your requirements in your inquiry. Eastern Mail Exchange, Wood Bldg., Glenside, Pa.

PRODUCTIVE Sales Letters; advertising literature. Craddock, 325 E. Bdwy., Salt Lake, Utah.

INFORMATION

WANTED—Lost Heirs and Next of Kin. If you have reason to believe that you are an heir to unclaimed money or estates, in any part of the world, send one dollar and four ancestral family names. Advertised for Index will be examined and report made to you at once. American Claim Agency, 100 Masonic Temple, Francesville, Ind., U. S. A.

753 TIME, Labor and Money Saving Ideas for all who own, drive or repair autos. These practical kinks are based upon the actual experiences of hundreds of owners and repairmen. Three books, Auto Owners', Auto Repairman's and Auto Tourists' Handbooks, regular $1.50 value will be supplied at 98c plus the postage C. O. D. for a limited time only. Send your order today to Popular Mechanics Press, Room 922, 200 E. Ontario St., Chicago.

HEIRS Wanted. "Lost Heirs"—A 92-page book filled with names for lost heirs and missing kin from different parts of the world. Chancery Court of England, Ireland and Bank of England lists included. Price one dollar. International Claim Agency, Dept. 189, Pittsburgh, Pa., U. S. A.

INVESTIGATING and Tracing. Work home or travel. Experience unnecessary. Write American System, 2188 Broadway, N. Y.

TYPING SERVICE

MANUSCRIPTS Neatly typewritten. 60c per thousand words with carbon copy. O. Berry, 6815 Michigan, St. Louis, Mo.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS—All standard makes, $6 to $35. Guaranteed. Write at once. Dee Typewriter Exchange, Ada, Okla.

TYPEWRITERS—Factory Rebuilt Royals, Remingtons, Underwoods. New Royal, Remington and Corona Portables. New "Excellograph" Rotary Stencil Duplicator $37.50. Terms. Catalog Free. Pittsburgh Typewriter Supply, 945—339 Fifth Ave., Pittsburgh, Pa.

TYPEWRITERS, all standard makes, $10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

TYPEWRITERS! All makes — lowest prices, big catalog free. Young Typewriter Co., 654 W. Randolph St., Dept. 5102, Chicago.

ALL makes, lowest prices, 5-year guarantee. Several specials. Free illustrated catalogue. Henry Typewriter Co., 217 West 125th St., New York, N. Y.

PRINTING, ENGRAVING AND MULTIGRAPHING

MULTIGRAPHING business correspondence, two dollars thousand. Hammermill letterheads, four dollars. Miscellaneous printing. Mayera Corporation, Monmouth, Ill.

CIRCULARS, 5,000—5½x8½—$11. 3½x6—4-page folders $14. All printing lowest prices. Samples. Garrison Press, Harrisonburg, Va.

500 LETTERHEADS and envelopes $3.25 prepaid. Hub Printery, 129 11th, Lincoln, Nebr.

50 EMBOSSED Linen Monogram Cards. Business-Professional. Beautiful sparkling raised blue letters, neat carton, $1 postpaid. Write plainly. Grout Print Service, San Bruno, Calif.

1,000 HEAVY Business Envelopes $2.95; 5,000 $12.75, delivered. Shaw, 106 Sand, Lackawanna, N. Y.

500 BUSINESS Cards 98c. Other Printing Reasonable. Samples Free. Hanzer's, 1039 S. Cleveland, Philadelphia, Pa.

100 BOND Letterheads and 100 envelopes printed, 98c. Kalata Printing Company, Ironwood, Mich.

225 HAMMERMILL Bond Letterheads, Envelopes, $1.00. De Toledo Printing Co., 455 N. 51st Street, Philadelphia, Pa.

CLASSY Business Cards—500, $2.25; 1,000, $3.50; postpaid; satisfaction guaranteed. Sheridan Printery, Sheridan, Wyo.

50 EACH, letterheads, envelopes, cards, $1.00. Sherman, Printer, Merriam, Kansas.

PRINTING—3,000 circulars for $2.40. Samples Free. Pitts, Amana, Iowa.

LETTERHEADS—Envelopes $2.90 Thousand Prepaid. Samples. Standard Company, St. Charles, Ill.

200 LETTERHEADS, 125 Envelopes, $1.00; 350 Cards $1.00. 108 Eureka, San Francisco.

SPECIAL Offer—150 Bond Letterheads, 8½x11, and 150 envelopes printed to order $1.50. J. Ferreira, 249 Eugenia St., New Bedford, Mass.

CARDS—1000 2x3½, $1.95. Printer, 462 W. 37th St., Los Angeles, Calif.

EVERYTHING Printed! Special — 250 Envelopes $1.00. Write Franklinpress, Milford, New Hampshire.

STATIONERY! If particular? Get Samples (stamp appreciated)—"Neargravure"—State Business—Sollidays, Knox, Indiana.

MULTIGRAPHING — Mimeographing: Business, Church and Club letters, postcards, notices, programs. Lowest prices. Fast service. Samples. Mailing Service Co., Elizabeth, N. J.

PRINTING—All kinds. Superior work, prices low. Battlefield Press, Gettysburg, Pa. Free battlefield souvenir.

200 LETTERHEADS and 100 envelopes, $1.10, postpaid. Oberman Company, Box 1268, Chicago.

IMITATION Typewritten Letters mimeographed: 500—$3.00; 1,000—$4.00; printed heads, 20-lb. bond, prepaid; samples, price-list, red stamp. Letter Service, 620 Woodland, Kansas City, Mo.

MULTIGRAPHED Letters $1.75 Thousand. Samples. Profit, Box 1071B, Knoxville, Tenn.

PUBLISH Your Own Magazine or House Organ. Our standardized service at one-fifth ordinary prices. Samples and particulars free. Evans Printing Company, Grand Rapids, Mich.

DISTINCTIVE — Artistic Business Stationery that Creates Confidence. 1,000 Letterheads or Envelopes $3.00. Samples. Moulton Printing Company, 1410-P East 8th, Kansas City, Mo.

WE print Stationery, Booklets, Catalogs, Circulars. Samples. Commercial Press, Batavia, Ohio.

250 BOND Letterheads, Envelopes, Billheads, Cards, $1.35 each. Economic Press, Leonia, N. J.

QUALITY Printing! Reasonable Prices! Send for Free Standardized samples and prices. Folders. Circulars. Catalogs our specialty. Earnest Fantus, 525 South Dearborn, Chicago.

1,000 ENVELOPES $2.95. Letterheads, circulars, folders, circular letters. We write advertising copy. Free samples. Able Printing Shop, 416 So. Dearborn, Chicago.

5,000 LETTERHEADS, $10.00, 20 lb. bond. Publications, catalogs big savings. Annville Printing Company, Annville, Pa.

PRINTING, OUTFITS AND SUPPLIES

PRINT your own cards, stationery, circulars, paper, etc. Complete outfits, $8.85; Job presses, $11, $29; rotary, $149. Print for others, big profit. All easy, rules sent. Write for catalog presses, type, paper, etc. Kelsey Company, F-11, Meriden, Conn.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalogue. Model Press, York, Penna.

DUPLICATORS AND DEVICES

HIGH Grade Stencil Duplicator. Prints post-cards, blotters, notices, etc., with or without illustrations. Complete Outfit $10.50. Send for literature and samples of printing. Salesmen wanted. Keller Manufacturing Co., Pasadena, Calif.

STENCIL Duplicator — $2.00 — Larger $3.00, $3.50, $4.00. Returnable. Samples. Circular. Primos Specialty Co., Primos, Pa.

YOU can make 50 to 100 copies of a letter, notice, etc., at a cost of three cents on a Heyer Quality Duplicator. Write for free trial offer. The Heyer Duplicator Co., 909 Jackson Blvd., Chicago, Ill.

RUBBER STAMPS

RUBBER Stamp—Name, address, three lines, pad, 75c cash; postpaid. Uzemor Stamp Works, Newcastle, Indiana.

RUBBER Stamps! Name, Address, Two lines 25c; Three lines 35c. DeLuxe Stamp Works, B572M, Auburn, Nebr.

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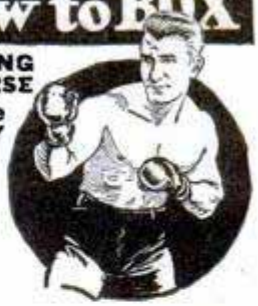

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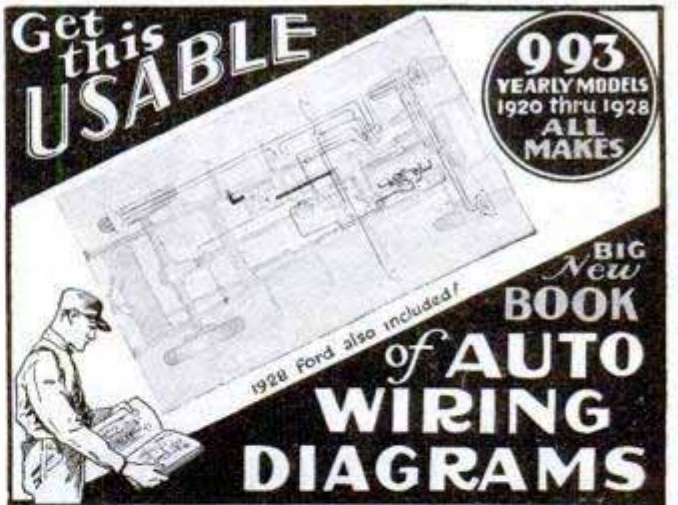

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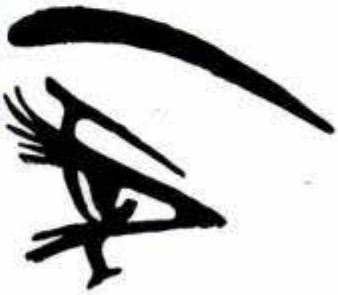

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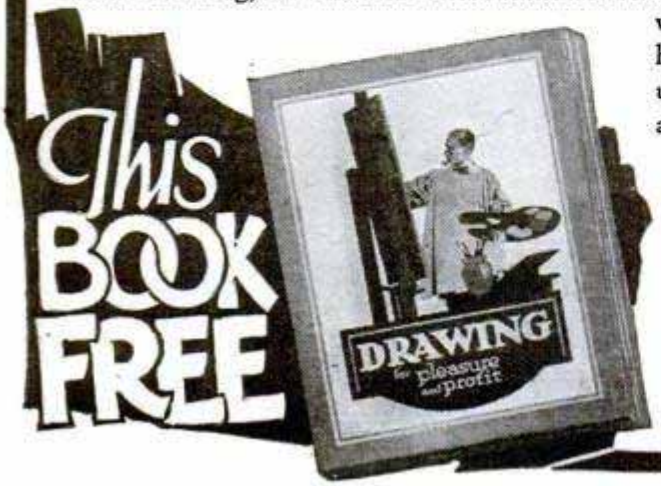

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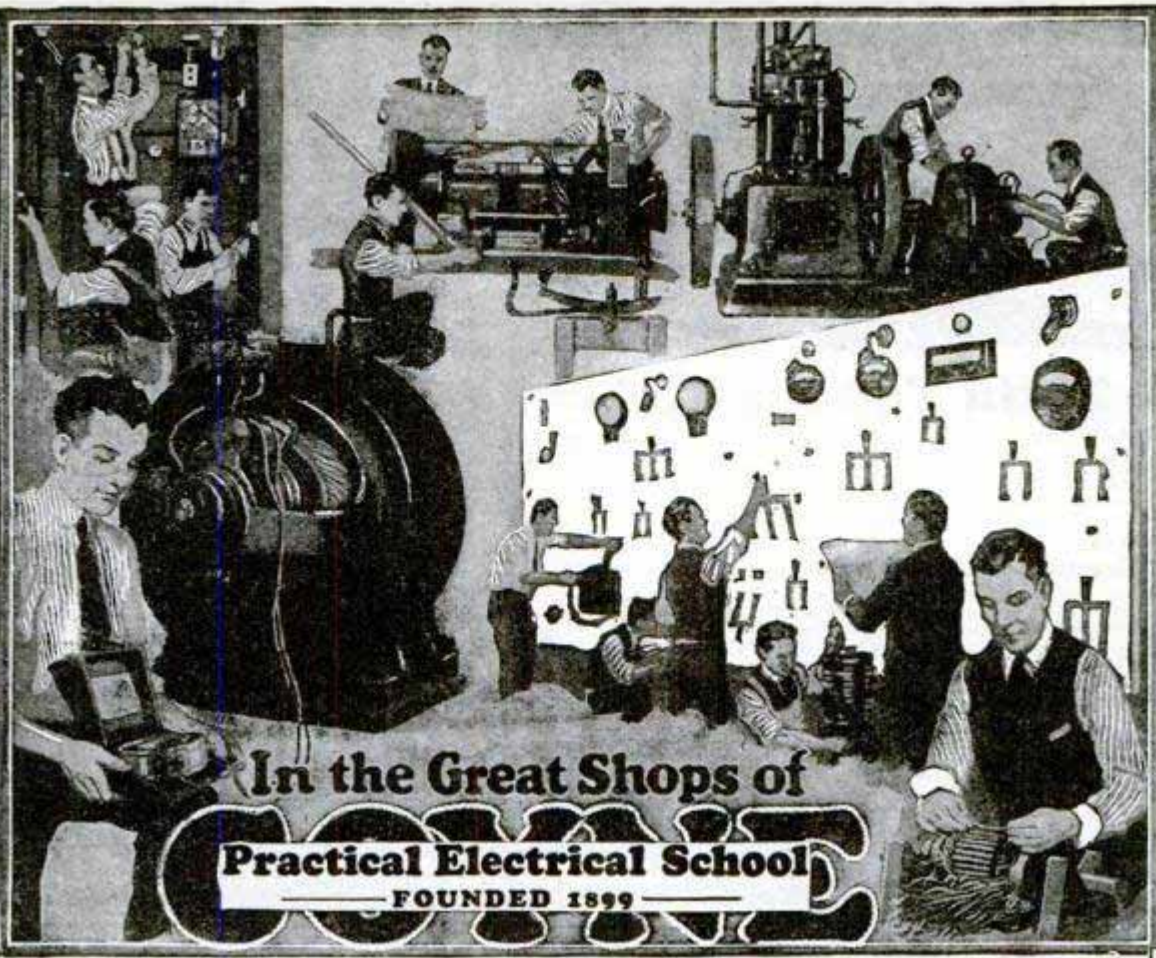

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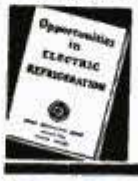

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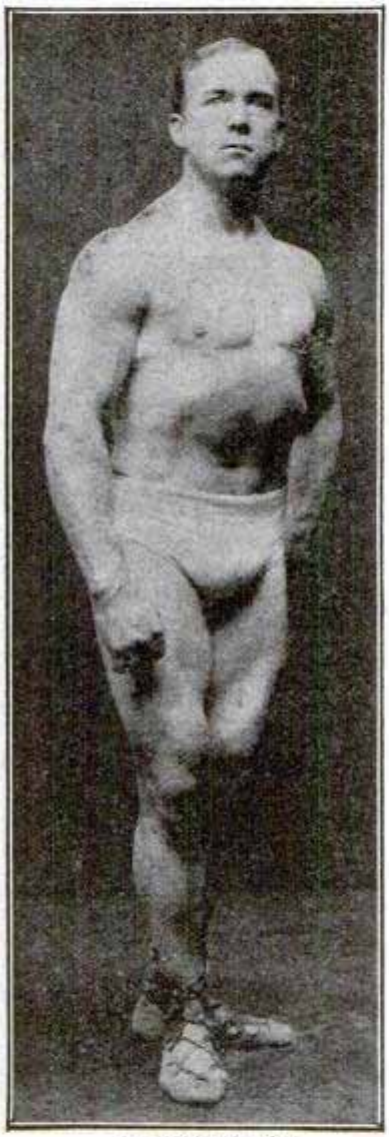

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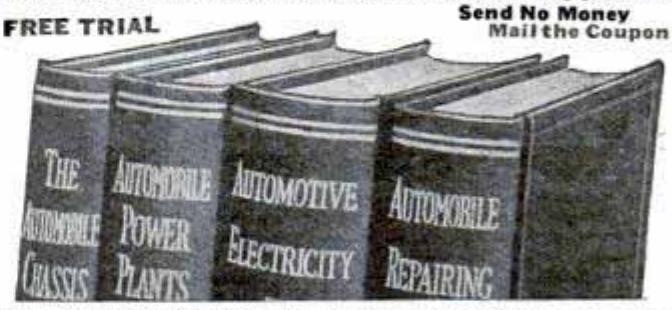

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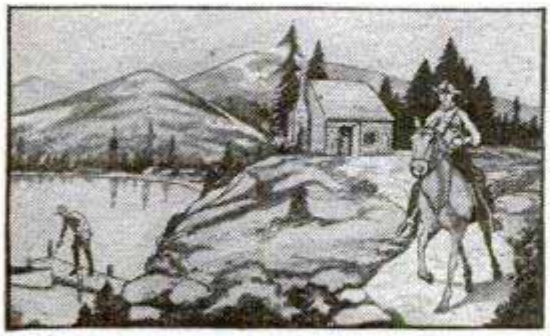

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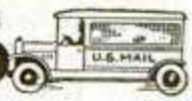

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Training for positions as Auditor, Comptroller, Certified Public Accountant, Cost Accountant, etc.

Other LaSalle Opportunities: LaSalle opens the way to success in every important field of business. If more interested in one of the fields indicated below, check here:

☐ Business Management
☐ Modern Salesmanship
☐ Traffic Management
☐ Railway Station Management
☐ Law—Degree of LL.B.
☐ Commercial Law
☐ Industrial Management
☐ Modern Foremanship
☐ Personnel Management
☐ Stenography
☐ Banking and Finance
☐ Modern Business Correspondence
☐ Expert Bookkeeping
☐ C. P. A. Coaching
☐ Business English
☐ Commercial Spanish
☐ Effective Speaking
☐ Stenotypy
☐ Telegraphy
☐ Credit and Collection Correspondence

Name .....

Present Position .....

Address .....

Your Neighbors Will Pay You $75.00 a week for Your Spare Time

You can easily sell them your spare hours for $3 each by serving as "radio doctor," building them sets, selling them supplies at less than retail. A membership in the Association shows you how to cash in on Radio now and trains you for the $3,000 to $10,000 openings awaiting qualified men. The Association starts you in business if you wish. Investigate all it has done for others, all it can do for you. A MEMBERSHIP NEED NOT COST YOU A CENT.

Earned $500 in Spare Hours

Our members are making big money with Radio. Werner Elchler, N. Y., earns $50 a week—Lyle Follick, Mich., has earned $500 —F. J. Buckley, Mo.—makes as much as he receives from employer —**all in spare time.** Our members are starting radio stores, getting better positions, increasing their salaries, earning money spare time.

ACT NOW—for No-Cost Membership

Send post card for details of Special Membership Plan that need not—should not—cost you a cent, and our book, "Your Opportunity in the Radio Industry." It will show you how you can cash in on Radio now—and later.

Radio Association of America

4513 Ravenswood Ave., Dept. PM-2, Chicago, Ill.

LEARN A TRADE *Be Independent*

EASY TO LEARN

Watchmaking, Watch and Clock Repairing, Engraving and Jewelry Work

EARN UP TO

$100 a Week

Big Demand For Trained Men

Great shortage of watchmakers, watch and clock repair men! Grasp this amazing opportunity. Steady employment in any section of the country. Uncrowded money-making field. We help you get big-pay job. Or you can own your own repair shop—easy to start—we show you how—fine income right from the beginning. NOW is the time to start—employers are writing us for trained men. Greatest opportunity of your life!

WE TEACH YOU QUICKLY

Takes but a few months to learn. Day or night school, no books, all personal instruction. Our profit-sharing plan helps you earn tuition. Work your way through school. We help you get part-time job.

FREE BOOK Write today for interesting book on watchmaking. It shows you the tremendous growth of the watch and clockmaking industry, the need for expert watchmakers and the wonderful money making prospects for men who are trained by our competent instructors. **Write Today,** SEND COUPON BELOW. NO OBLIGATION.

NATIONAL SCHOOL OF WATCHMAKING
1340 South Michigan Avenue Dept. 34 Chicago, Ill.

NATIONAL SCHOOL OF WATCHMAKING
1340 South Michigan Avenue, Dept. 34, Chicago, Ill.

Send me FREE BOOK on watchmaking, watch and clock repairing, engraving and jewelry work.

NAME.....

ADDRESS.....

.....

Материал защищенный авторским правом

Just A Twist Of The Wrist

Banishes Old-Style Can Openers to the Scrap Heap and BRINGS AGENTS $6 to $8 IN AN HOUR

WOMEN universally detest the old-style can opener. Yet in every home in the land cans are being opened with it, often several times a day. Imagine how thankfully they welcome this new method—this automatic way of doing their most distasteful job. With the Speedo can opening machine you just put the can in the machine, turn the handle, and almost instantly the job is done.

End This Waste and Danger

You undoubtedly know what a nasty, dangerous job it is to open cans with the old-fashioned can opener. You have to hack your way along slowly—ripping a jagged furrow around the edge. Next thing you know, the can opener slips. Good night! You've torn a hole in your finger. As liable as not it will get infected and stay sore a long time. Perhaps even your life will be endangered from blood poisoning!

You may be lucky enough to get the can open without cutting yourself. But there's still the fact to consider that the ragged edge of tin left around the top makes it almost impossible to pour out all of the food. Yet now, all this trouble, waste and danger is ended. No wonder salesmen everywhere are finding this invention a truly revolutionary money maker!

A "Million Dollar" Can Opening Machine

The Speedo holds the can—opens it—flips up the lid so you can grab it—and gives you back the can without a drop spilled, without any rough edges to snag your fingers—all in a couple of seconds! It's so easy even a 10-year old child can do it in perfect safety! No wonder women—and men, too—simply go wild over it! No wonder Speedo salesmen often sell to every house in the block and make up to $10 an hour.

Generous Free Test Offer

Frankly, men, I realize that the profit possibilities of this proposition as outlined briefly here may seem almost incredible to you. So I've worked out a plan by which you can examine the invention and test its profit without risking one penny.

Get my free test offer while the territory you want is still open—I'll hold it for you while you make the test. I'll send you all the facts about $75 to $150 a week. I'll also tell you about another fast selling item that brings you two profits on every call. All you risk is a 2c stamp—so grab your pencil and shoot me the coupon right now.

SPEEDO

PATENTED HOUSEHOLD SPECIALTIES

CENTRAL STATES MFG. CO., Dept. B-701
4500 Mary Ave. Est. Over 20 years. **ST. LOUIS, MO.**

READ!

$265 In a Week

"Here is my record for first 30 days with Speedo: June 13, 60 Speedos; June 20, 84 Speedos; June 30, 192 Speedos; July 6, 288 Speedos. Speedo sells to 9 out of 10 prospects." M. Ornoff, Va.

J. J. Corwin, Ariz., says "Send more order books. I sold first 14 orders in 2 hours."

A. Piotraschke, Mich., writes, "Send order book and folders—only worked 3 hours and got 9 orders." Barb, W. Va., says, "Was only out a few evenings and got 20 orders."

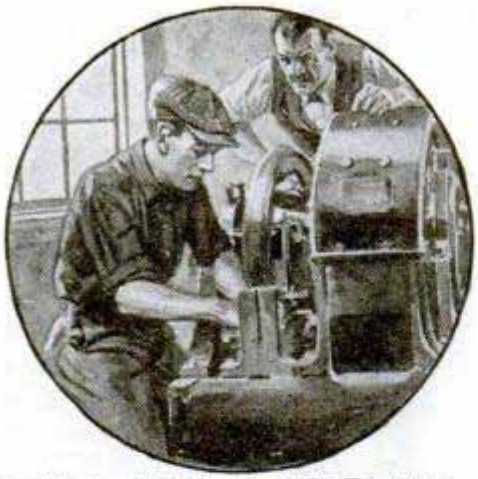
Central States Mfg. Co.,
4500 Mary Ave., Dept. B-701,
St. Louis, Mo.

Yes, rush me the facts and details of your FREE OFFER.

Name.....

Address.....

City.....State.....



ELECTRICAL EXPERTS IN DEMAND

Good positions await trained men. Salaries of $12 to $30 a day are paid many experts in this field.

THE Electrical field needs men. It needs them badly. Hardly a month or a year passes but what some new use for electricity is discovered. Each new use means new positions—*better positions*—for men who have trained themselves as experts in this wonderfully fascinating work.

Why don't *you* study electricity and prepare for a good position at a good salary?

You can do it right at home in spare time through the International Correspondence Schools. Home-study courses endorsed by Edison and Steinmetz. Successful students everywhere.

Mark and mail the coupon today for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 5510-F, Scranton, Penna.

Without cost or obligation, please tell me how I can qualify for the position, or in the subject, *before* which I am marking X:

- ☐ Electrical Engineer
- ☐ Electrician
- ☐ Electric Wiring
- ☐ Electric Lighting
- ☐ Telegraph Expert
- ☐ Practical Telephony
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Toolmaker
- ☐ Machine Shop Practice
- ☐ Gas Engineer
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Reading Architects' Blueprints
- ☐ Metallurgy ☐ Architect
- ☐ Architectural Draftsman
- ☐ Plumbing and Heating
- ☐ Sheet Metal Worker
- ☐ Automobiles
- ☐ Airplane Engines
- ☐ Chemical Engineer
- ☐ Pharmacy
- ☐ Salesmanship
- ☐ Show Card and Sign Lettering
- ☐ Railroad Positions
- ☐ Illustrator
- ☐ Industrial Management
- ☐ Secretarial Work
- ☐ Business Correspondence
- ☐ Accounting and C.P.A. Coaching
- ☐ Bookkeeper
- ☐ Stenographer and Typist
- ☐ Traffic Management
- ☐ English
- ☐ Common School Subjects
- ☐ Civil Service
- ☐ Railway Mail Clerk
- ☐ Textile Overseer or Supt.
- ☐ Agriculture
- ☐ Spanish
- ☐ Navigator
- ☐ Mathematics
- ☐ Poultry Raising
- ☐ Radio

Name.....

Street Address.....

City..... State.....

Occupation.....

Canadians should send this coupon to International Correspondence Schools Canadian, Limited, Montreal, Canada

BE A RAILWAY TRAFFIC INSPECTOR

EARN UP TO $250 Per Month

Do You Want to Earn Real Money in a pleasant profession where you are practically your own boss, see new faces and places each minute of the day, are rapidly promoted? Do you want to be out in the open, away from dirty shop and monotonous desk—dressed in good clothes—a credit to yourself and the firm you represent?

POSITIONS OPEN—WAITING FOR YOU

All over the country—perhaps in your own home town—men are needed in Traffic Inspection. You can take one of these positions—after a few months spare time home study. Lessons are clearly written, and easy to understand and apply. You are equipped to accept a position as soon as you complete our training.

For 9 years we have offered positions for 99.5% of our graduates, a short time after completing their course. And last year, every graduate was offered a position at $120 per month or more salary.

Here's one of hundreds of letters from our students:

> DEAR SIR:
> After completing a course in Traffic Inspection through your school in the year of 1918 I was immediately put to work on an assignment.
> I have been engaged in this work ever since and am collecting approximately $180 per month at present.
> * * * To anyone desiring an outdoor life with work that is interesting, I recommend a course in Traffic Inspection through the Standard Business Training Institute. (Signed) T. S. ADAMS.

SEND FOR FREE BOOKLET

Learn about this great, uncrowded profession—and our refund and employment agreement today. Our free booklet tells all about Traffic Inspection—how we have been able to place our graduates in positions at definite salaries—why they are so soon promoted to positions paying $135, $150, $175, $200, $250 per month—and what we can do for you.

Standard Business Training Institute
Div. 2 **BUFFALO, NEW YORK**

Now *You* can learn Accounting

YOU WOULD like to earn more money. But what are you doing about it?

The world's biggest rewards go to the men who *know*. What are you doing to *learn* more? Why not start *now* to get the big things?

You can. The Accounting field today offers an extraordinary opportunity to those who have the foresight to reach out and take it. And now, thanks to the authoritative and interesting I. A. S. Course, you can learn Accounting in twelve short months—*while* you are continuing in your present job.

International Accountants Society, Inc.
A Division of the
ALEXANDER HAMILTON INSTITUTE

To the International Accountants Society, Inc.
3411 So. Michigan Ave., Chicago, Ill.

Send me, *free*, "How to Learn Accounting," and tell me how I can increase *my* income.

Name.....

Street.....

City..... State.....

161

Worth Money to Ruptured!

Send New FREE BOOK and Amazing FREE SAMPLE of AIRTEX Without Obligation

Name.....

Address.....

City.....State.....

Mail this coupon to New Science Institute, 2145 Clay Street, Steubenville, Ohio

Here is an amazing offer to victims of rupture—an offer that has proved to be worth hundreds of dollars to many who have accepted it. Yet it costs you nothing.

A famous rupture specialist with a record of more than 20,000 cases will send you free of cost a newly-edited book that contains amazing new discoveries about rupture relief . . . case histories galore . . . illustrated in detail. A few of the facts contained in this free book are given below. But do this right now. Tear out the coupon at the right and send for this unusual book!

Can Rupture Be Exercised Away? Get Newest Book Now FREE to Ruptured

"IT was twenty years ago when I first got ruptured. Today I consider myself entirely cured. Your system is nothing short of marvelous." John Miller, Jr. "Some months ago I ordered your outfit for the treatment of rupture of my son. Our doctor fitted it on him and he was skeptical it would help cure the condition, for it was one of the worst ruptures he had ever seen. Five months later I took the boy back to the doctor. He examined him and pronounced the rupture completely healed." D. E. Lytle, Orrville, Ohio.

These are but two of many astounding letters received from people, many of whom had despaired of obtaining relief from the torture and agony of rupture.

Never Before a FREE SAMPLE Like This

Not a Truss

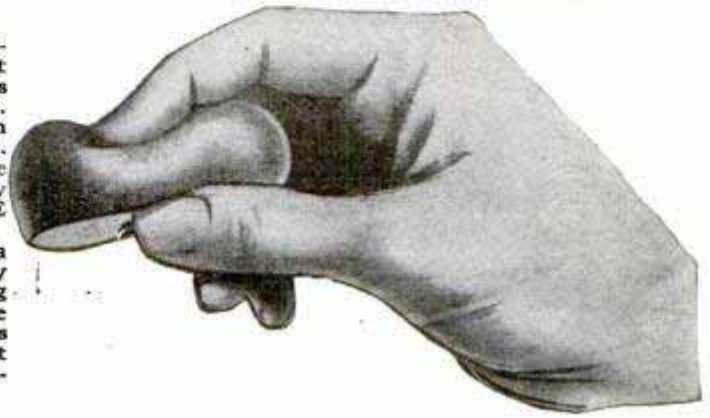
What is this wonderful device that has made thousands feel again the joy of living a full life? It is not a truss like men wore in the days of Lincoln. It has no steel springs, no leg straps, no bulky cushions. It can never slip off the rupture. Wearing it, you can still cough, run, jump, bend or sleep in any position. In fact, many are able to work every day—exercise as much as they desire—probably we should say truthfully actually **EXERCISING** RUPTURE **AWAY!**

Imagine a simple little device weighing less than a feather—little larger than a quarter—that rests firmly against the rupture without the need of strapping tightly. Think of a flesh-soft pad that yields with the slightest movement of your body—filled with millions of air-cells that breathe fresh, cool air into the spot around the rupture. And all the while blood circulation is more free and more unhampered. Thus nature is allowed to knit new tissues together so that rupture often disappears completely without a trace remaining—in unbelievable time. Incredible? Yet the facts are ready now!

Now or Never

Be fair to yourself. Get the complete facts about Magic Dot and the offer that permits you to feel this marvelous relief, before you decide to buy. Don't go through life in constant pain. Relief from rupture is certainly worth the 2c stamp it costs you to send the coupon above. Send it—not tomorrow or next week—but NOW!

NEW SCIENCE INSTITUTE
2145 Clay Street
Steubenville, Ohio



GENUINE CORONA

Limited Offer

$2.00 DOWN BALANCE EASY TERMS

HERE'S your chance to secure that Corona you've wanted —on the easiest terms ever offered —at ONE-THIRD OFF regular price! Complete in every detail; two color ribbon, back spacer, beautifully re-newed, NEW MACHINE GUARANTEE. Recognized the world over as the finest, strongest, sturdiest portable built. Only a limited number of these splendid machines available. To get one, you must act now!

Yours For 10 Days FREE Send No Money

Experience the joy this personal writing portable typewriter can give you! Use it 10 days free! See how easy it is to run and the splendidly typed letters it turns out. Ideal for the office desk, home, travelling. Small, compact, light, convenient. Don't send out letters, reports, bills in poor handwriting when you can have this Corona at such a low price or on such easy terms.

Carrying Case Included —If You Act Now

Leatheroid carrying case, oiler, instructions free on this offer. Send no money—just the coupon. Without delay or red tape we will send you the Corona. Try it 10 days. If you decide to keep it, send us only $2—then $3 a month until our special price of $36.25 is paid (cash price, $33.10). Now is the time to buy. This offer may never be repeated. Mail coupon now.

$16 SAVED by using this coupon

SMITH TYPEWRITER SALES CORP.
842-360 E. Grand Ave., Chicago.

Ship me the Corona, F. O. B. Chicago. On arrival I'll deposit $2 with express agent. If I keep machine, I'll send you $3 a month until the $34.25 balance of $36.25 price is paid; the title to remain with you until then. I am to have 10 days to try the typewriter. If I decide not to keep it, I will repack and return to express agent, who will return my $2. You are to give your standard guarantee.

Name.....

Address.....

Employed by.....

BIG NOVELTY BARGAIN! 10c

Throw Your VOICE

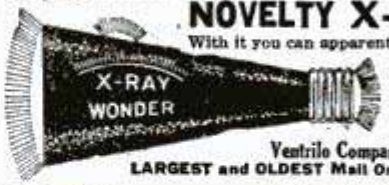
Into a trunk, under the bed or anywhere. Lots of Fun fooling the Teacher, Policeman or Friends. **Barrels of Fun.**

THE VENTRILO—

a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Sent with full instructions; anyone can use it. **NEVER FAILS.**

Also a 32 PAGE BOOK ON VENTRILOQUISM. Formula for Secret Writing, 12 Money Making Secrets and the marvelous

NOVELTY X-RAY WONDER



With it you can apparently see the bones in your fingers, lead in pencil, etc.; lots of fun with this outfit. Also 10 Big Magic Tricks Free with every order. All the above Novelties by prepaid mail for **10c**

Ventrilo Company, Dept. 725, Norwalk, Conn.
LARGEST and OLDEST Mail Order House in Connecticut

Every Boy His Own Toymaker

Make your own boats, kites, airplanes, traps, sleds, stilts, diving boards, bird houses, etc. 64 pages illustrated, 10c. Amateur electrician's book, 64 pages illustrated, 10c. 200 kinds iron, wood and wire puzzles catalog with pictures of all and one of our best 25c ones for a dime, postpaid

Western Puzzle Works, Saint Paul, Minnesota

Deafness

Perfect hearing is now being restored in all cases of deafness caused by Catarrhal troubles, Relaxed or Sunken Drums, Thickened Drums, Roaring or Hissing Sounds, Perforated, Wholly or Partially Destroyed Drums, Discharge from the Ears, etc.

Wilson Common-Sense Ear Drums

require no medicine but effectively replace what is lacking or defective in the natural ear drums. They are simple devices, which the wearer easily fits into the ears where they are invisible. Soft, safe and comfortable. Write *today* for 168-page book on deafness giving full particulars and many testimonials. The hearing of thousands of grateful users has been restored by these *"little wireless phones for the ears."*

Free Book on Deafness

WILSON EAR DRUM CO., Incorporated
854 Todd Bldg. LOUISVILLE, KY.

DON'T WEAR A TRUSS

BE COMFORTABLE—

Wear the Brooks Appliance, the modern scientific invention which gives rupture sufferers immediate relief. It has no obnoxious springs or pads. Automatic Air Cushions bind and draw together the broken parts. Nosalvesor plasters. Durable. Cheap. Sent on trial to prove its worth. Beware of imitations. Never sold in stores nor by agents. Every appliance made to special order and sent direct from Marshall. Full information and booklet sent free in plain, sealed envelope.

MR. C. E. BROOKS

BROOKS APPLIANCE CO., 107A State St., MARSHALL, MICH.

$10.00 PER MONTH BUYS
Fibre-Lite Limbs

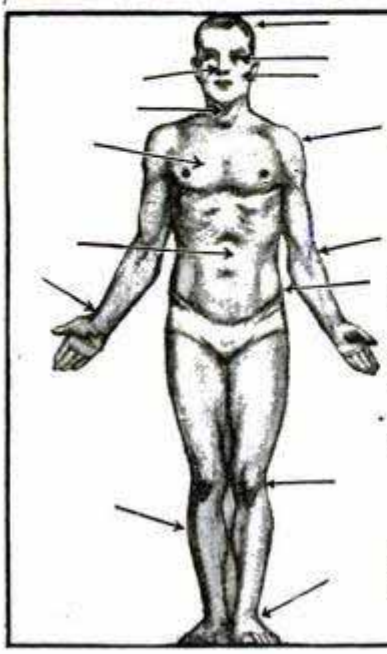
NEXT TO NATURE. BRACES MADE TO ORDER. AGENTS WANTED. FREE FIBRE SAMPLE
WORMAN CO.
252-P HENNEPIN AVE. MINNEAPOLIS, MINN.

Skin Troubles

Cleared up—often in 24 hours. To prove you can be rid of Pimples, Blackheads, Acne Eruptions on the face or body, Barbers' Itch, Eczema, Enlarged Pores, Oily or Shiny Skin, simply send me your name and address today—no cost—no obligation. **CLEAR-TONE** tried and tested in over 100,000 cases—used like toilet water—is simply magical in prompt results. You can repay the favor by telling your friends; if not, the loss is mine. WRITE TODAY.

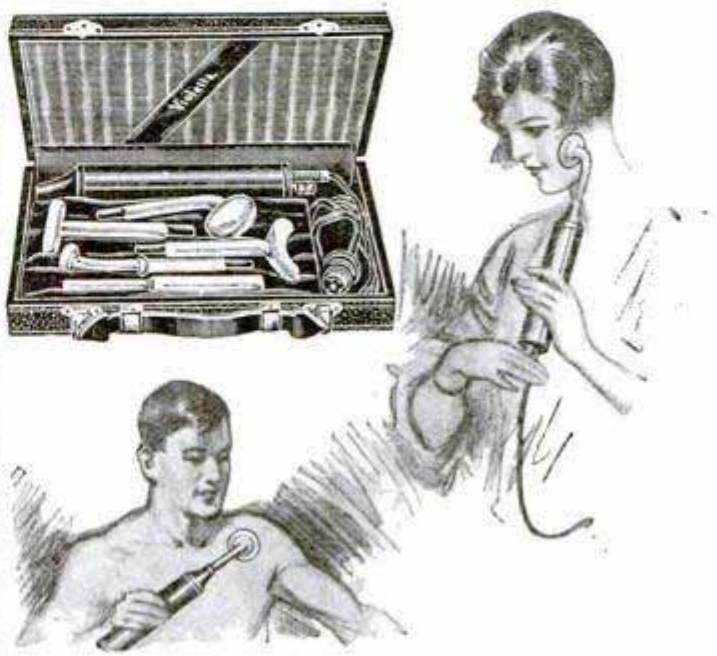
E. S. GIVENS, 428 Chemical Bldg., Kansas City, Mo.

PAIN and Disease Now Quickly Conquered by VIOLET RAY



Ailments Successfully Treated With Violet Ray

Rheumatism
Paralysis Neuritis
Neuralgia Lumbago
Nervousness
Hay Fever Asthma
Influenza Catarrh
Prostate Trouble
Skin Diseases
Eczema Pimples
Blackheads
Falling Hair
Poor Complexion
Headaches
Insomnia Goitre
Obesity Deafness
Constipation



Scientific, Painless Treatment Used by Doctors, Hospitals, Sanitariums Now Offered to Every Home

The mysterious, baffling, supernatural powers of Violet Rays, discovered by Nikola Tesla, the electrical genius, are as phenomenal as the marvels of radio. Why Violet Rays should possess such miraculous curative powers over pain and disease is as much a mystery as the ether wave's ability to transmit a whisper through miles of space.

Let us tell you how thousands of men and women suffering from rheumatism, nervousness, skin diseases, headaches, constipation, sprains, falling hair, obesity and many other ailments, have found quick relief—new health and vitality — with this marvelous scientific invention. We also have many positively astounding letters from former sufferers of paralysis. Pains vanish almost instantly.

Science has proved that the tissues, blood, bones, nerves, hair, nails and other parts of the human anatomy are composed of billions of cells. When these cells function improperly, become inactive, fail to absorb and burn up oxygen and throw off waste products caused by this combustion, the result is pain, disease, and often death.

Violet Rays go direct to the source of the trouble. They stimulate human cells to healthy activity as positively as an electric current revives a run-down battery.

Violetta is an invention for making genuine violet rays from any electric current. It has long been used and endorsed by hospitals, sanitariums and physicians everywhere. It's a demonstrated success. Every home should have a Violetta outfit. Saves hours, days, months of suffering. No medicine. Painless, pleasant, ever-ready treatment. Only the Violet Ray can penetrate to every cell and nerve affected. Simple, safe, painless—anyone can use Violetta.

Violetta

10 Days FREE TRIAL

For Health—Beauty—Vigor

This Book FREE

Tells all about Violet Rays and the long list of ailments successfully treated—how this marvelous invention now brings this mysterious curative power to all. Why suffer pain and poor health when you can try a Violetta Outfit in your own home 10 days FREE?

Send for this book now. Read some of the many astounding testimonials it contains from users who have tried this new way to health, beauty, vigor.

Mailing the coupon places you under no obligation. Send for all the facts and our liberal free trial offer today.

HUNDREDS REPORT ASTOUNDING RESULTS

Rheumatism "The Violetta is everything it is claimed to be."

Lumbago "Drugs cannot compete with it for Lumbago and Rheumatism; or when a general toning up of the system is desired."—A. J. Albert, Minnesota.

Neuritis "The Violetta which I received worked wonders on the neuritis of eight years' standing. I had taken all kinds of medicine, tried osteopathic and chiropractic treatments without benefit. Now I am able to sleep nights as I did before the trouble came on. Am gaining right along."—J. T. Blackman, Calif.

Asthma "Your Violetta has completely cured asthma that I had for 25 years. I am a booster for your Violet Ray in every way."—W. E. Hopson, Texas.

Headaches "I am tickled pink over it. Beats medicines every way. Suffered with headaches and have never used anything that gives as quick relief. Wouldn't take $100 for my Violetta if I couldn't get another."—Mrs. Ora Gallon, Michigan.

Acne "I used the Violetta for a severe case of Acne. It helped me considerably, for the Acne is gone."—H. J. Kobber, Chicago.

VI-REX COMPANY, 2304 Warren Ave., Dept. 231, Chicago, Ill.

VI-REX COMPANY
2304 Warren Ave.
Dept. 231, Chicago

Please send me your free book on Violet Rays and details of your 10-day free trial offer.

Name.....

Address.....

City.....State.....

Ailment.....

YOU'RE NEXT
Now Watch YOUR Muscles GROW!

BEFORE

Here's how this lad looked when he first wrote to me. Pretty hopeless-looking case, wasn't he? Pipe those skinny arms, that flat, narrow chest. Then I started to do my stuff, and see what happened!

SEE that boy in the picture? Look what I did for HIM in thirty days! Made him over from head to foot! Changed him from a puny weakling into a GIANT OF STRENGTH. Look at those muscles I put on his arm; wouldn't YOU be proud of a development like that?

Boy, I'm going to give it to you! I'm going to cover your frame with big, brawny, rippling muscles—PANTHER MUSCLES—alive with terrific, lightning-like power. Just give me a few minutes a day in your own home. In a week you won't know yourself. In 30 days you'll have the proportions of a Hercules.

In 30 Days I'll Increase Your Muscles by Inches

Yes, sir, you'll actually see your muscles GROW! Every day your mirror will show an amazing improvement. I've worked these "MIRACLES IN MUSCLE" for thousands of others. I GUARANTEE to accomplish the same results for YOU. I don't care what your present condition may be. If you're run-down and sickly, I'll transform you into the picture of health. I'll fill you full of high-voltage PEP. If you're already a strong, well-developed lad, I'll put you into CHAMPIONSHIP form.

30 DAYS LATER

NOW look! Here's the same boy made over. His body is loaded with muscle. He's strong as an ox; he's got a superb development that people look at with admiration. Mail the coupon and find out how I can do the same for YOU.

Titus, Dept. M-123
105 East 13th St.,
New York, N. Y.

Please mail me, FREE, your big illustrated book of Muscle-Building Secrets. No cost, no obligation.

Name.....

Address.....

Town.....State.....

Amazing Book FREE

Shoot your name and address along. Use the coupon, a postcard or a letter. I'll send you the most astounding book you ever read—filled with inside secrets of building muscle.

The One and Only TITUS 105 East 13th Street NEW YORK, N. Y.

TELEGRAPHY

(Morse and Wireless) and RAILWAY ACCOUNTING taught thoroughly. Big salaries; great opportunities. Oldest, largest school. Endorsed by Telegraph, Railway, Radio, and Government officials. Expenses low—opportunities to earn large portion. Catalog free. **DODGE' INSTITUTE, Jones St., Valparaiso, Ind.**

AMERICA'S GREATEST TAILORING LINE

FREE 130 large Swatch Samples—All Wool—Tailored-to-Order—Union Made—sensational low price. Get outfit at once. Address Dept. 331.
GOODWEAR, 844 Adams, CHICAGO

WIN $2500.00!

To advertise our product we are going to give over $5000.00 in prizes. Have already given away thousands of dollars. Virginia Umbarger won $1445.00, Effie Swearingen, $1500.00, Louis Siltberg $2000.00, and others. Addresses on request. You can win $2500.00.

Can You Find the Twins?

No, it's not as easy as it looks because two, and only two of the hats on the girls pictured to the right are exactly alike. Find them—mark them—send your answer today. 350 big costly prizes will be given and duplicate prizes will be paid in case of ties to those tying. Costs you nothing, now, later, or ever. All who answer can share in cash prizes. Everybody rewarded. Send answer—learn how to get this prize.

$500.00 Extra for Promptness
—making total prize you can win $2,500.00. Send no money, just find twin hats, mark them, answer today.

G. A. Culver, Advertising Manager, Room 49, 500 North Dearborn St., Chicago

---

"Due to your well prepared training, I received my appointment eight days after my name was placed on the register. David W. Tucker."

WORK FOR "UNCLE SAM"

$1700 to $3000 Year

RAILWAY POSTAL CLERKS MAIL CARRIERS

COUPON →

TRAVEL—See Your Country

MEN, BOYS, 17 UP SHOULD MAIL COUPON IMMEDIATELY

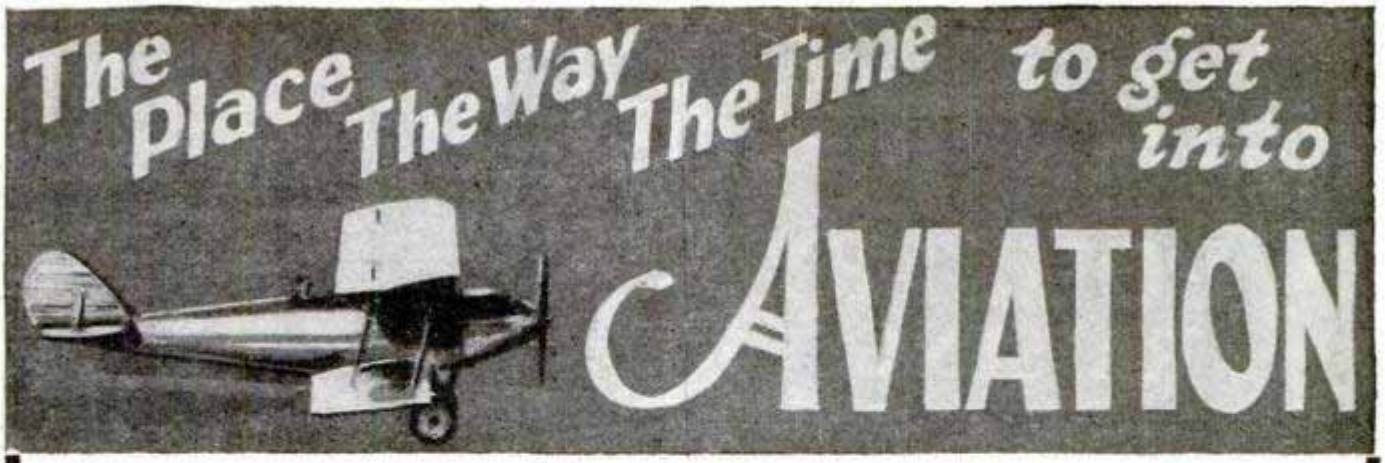
Steady Work *No Layoffs* *Paid Vacations*

FRANKLIN INSTITUTE
Dept. W175, Rochester, N. Y.

Sir: Rush to me without charge (1) Specimen Railway Postal Clerk and Mail Carrier coaching. (2) FREE 32 page book with list of U. S. Government positions now obtainable.

Name.....

Address.....



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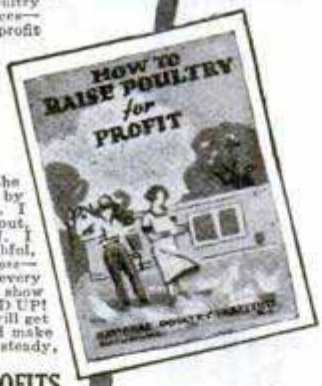

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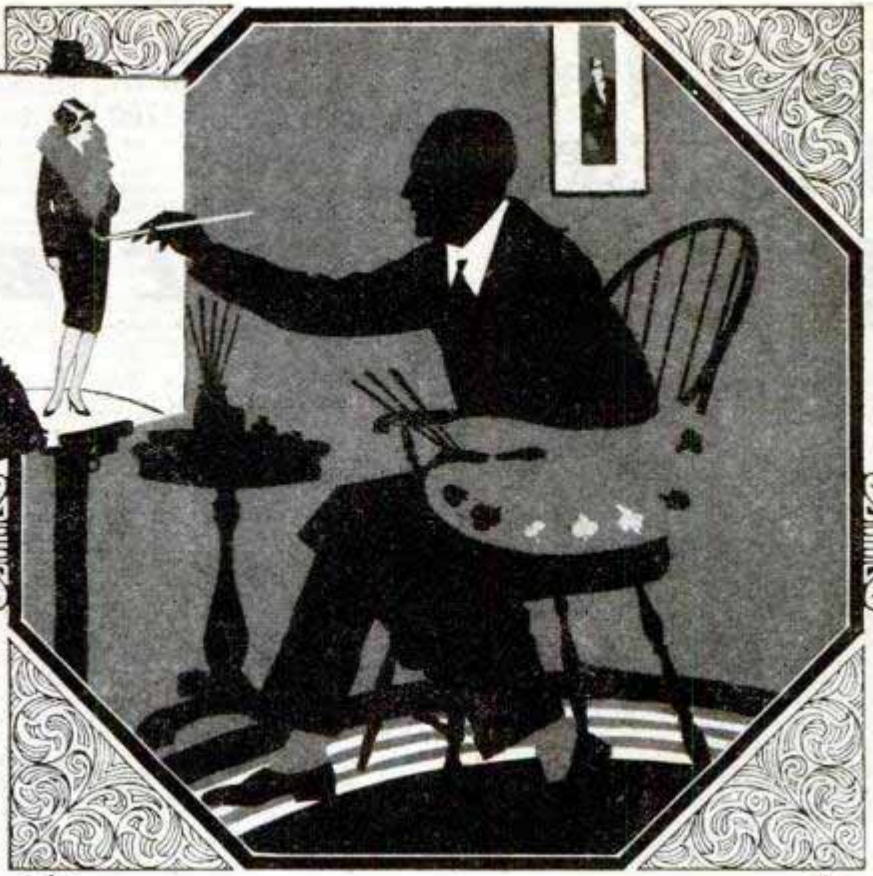

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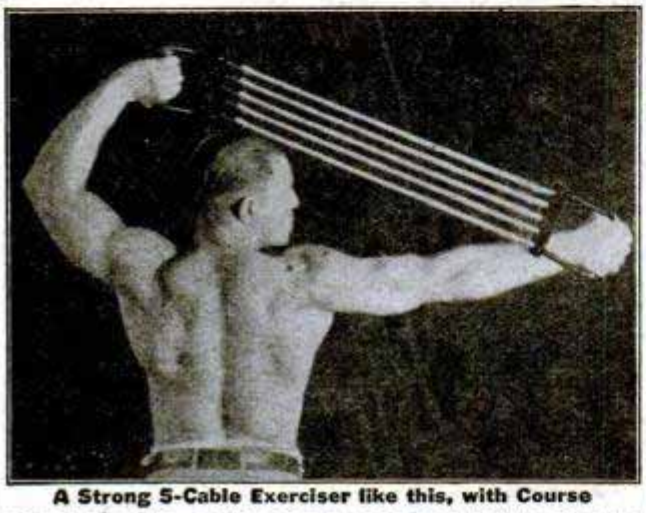

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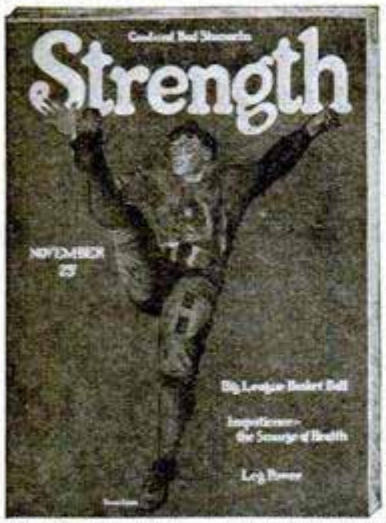

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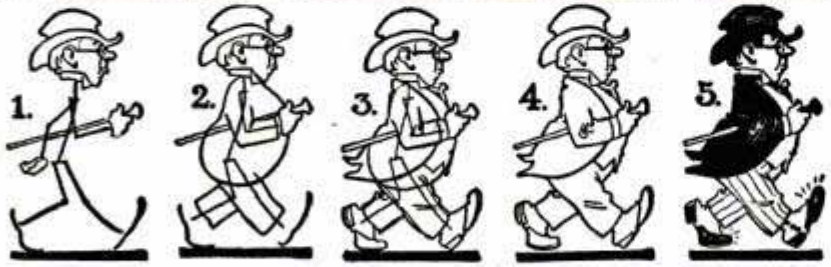

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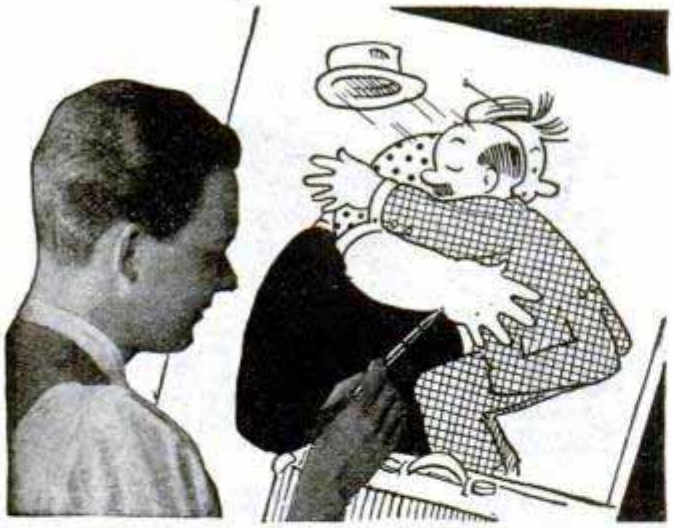

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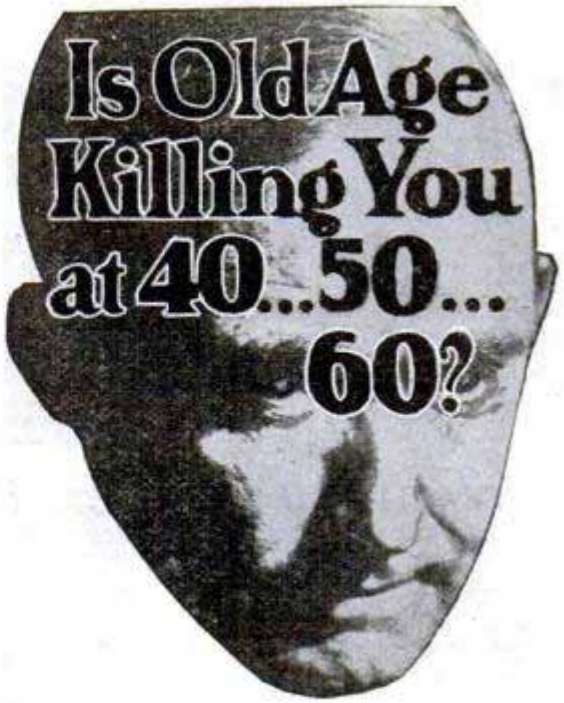

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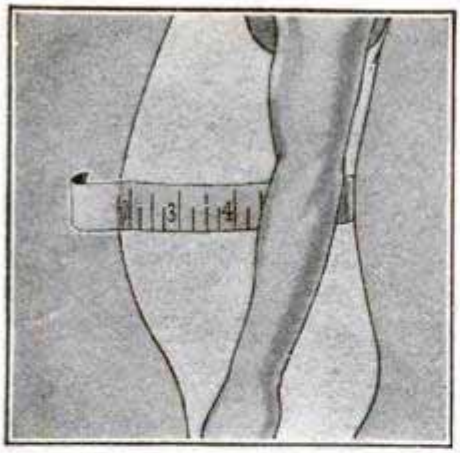

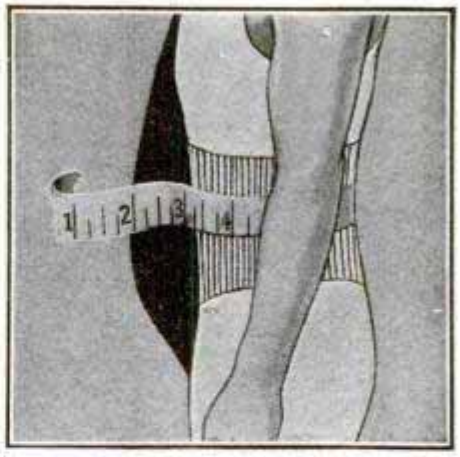

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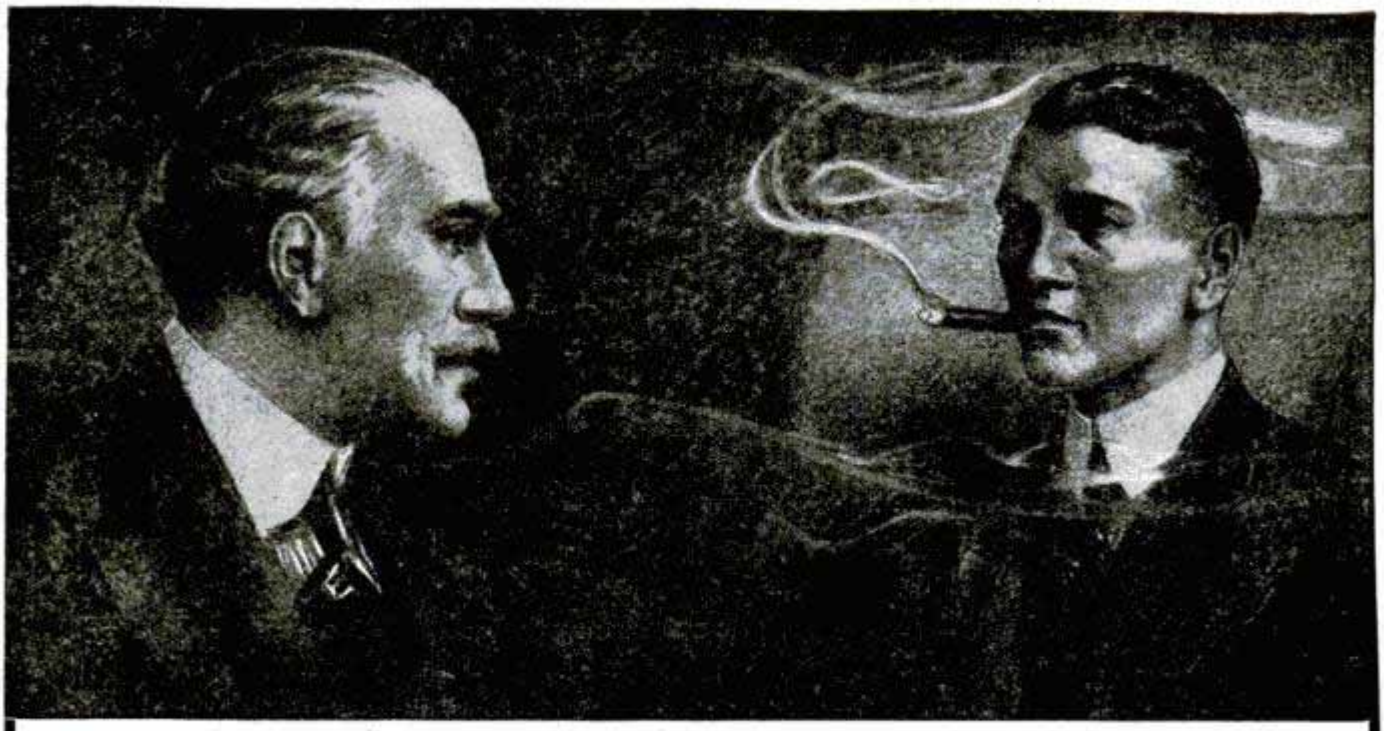

Tobacco Is Hurting You

Look at the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For **you** know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but **sure.**

Tobacco is lowering your efficiency. It slows a man down. Makes it harder for you to concentrate your mind on your work. You haven't near the amount of "pep" and energy you would have if you stopped using it. There's many a man twice as old as you in years who's twice as young in energy, simply because he lets tobacco alone.

Some day you will realize to what an alarming extent tobacco **has** undermined your system.

When your hands begin to tremble—
and your appetite begins to fail—
and your heart seems to "skip a beat" now and then—
and slight exertion makes you short of breath—
then you have a right to suspect that TOBACCO is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And **YOU** know that the use of tobacco in **any** form **is an expensive,** utterly useless habit. You know you **ought** to quit.

Tobacco Habit Banished

Let Us Help You

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it—whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a very few days. Not the slightest shock to the nervous system. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

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Free Book Coupon

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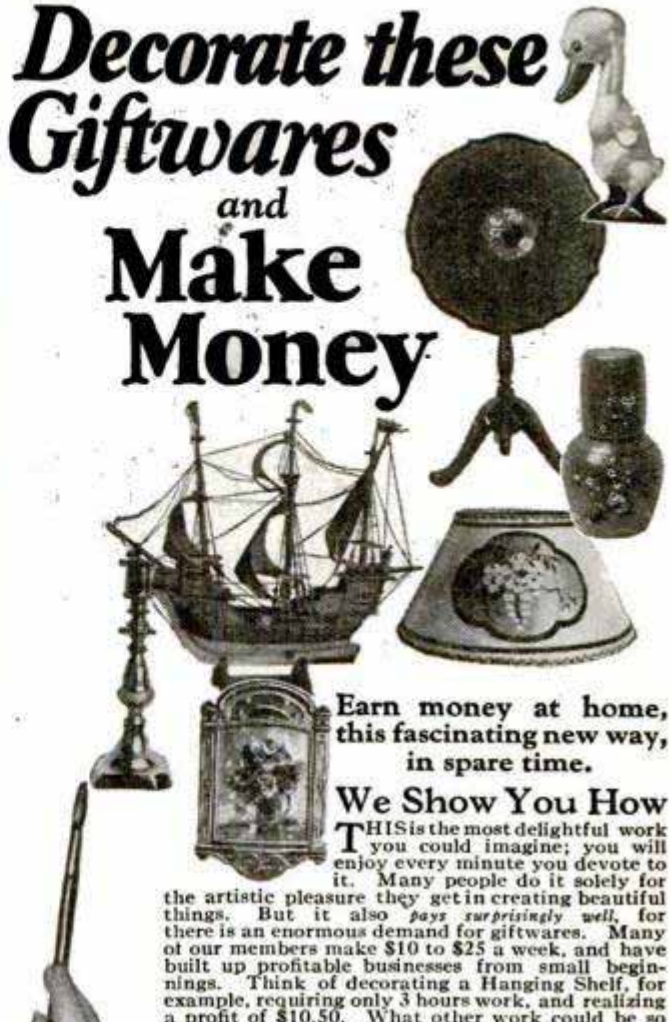

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THIS is the most delightful work you could imagine; you will enjoy every minute you devote to it. Many people do it solely for the artistic pleasure they get in creating beautiful things. But it also *pays surprisingly well*, for there is an enormous demand for giftwares. Many of our members make $10 to $25 a week, and have built up profitable businesses from small beginnings. Think of decorating a Hanging Shelf, for example, requiring only 3 hours work, and realizing a profit of $10.50. What other work could be so interesting, and pay so well?

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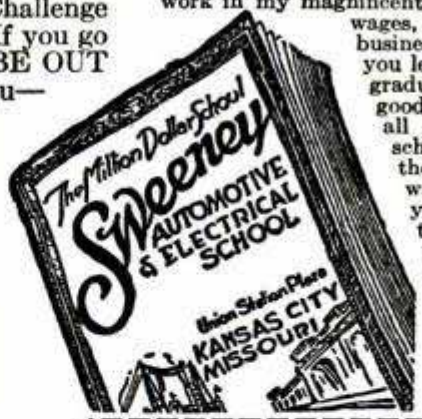

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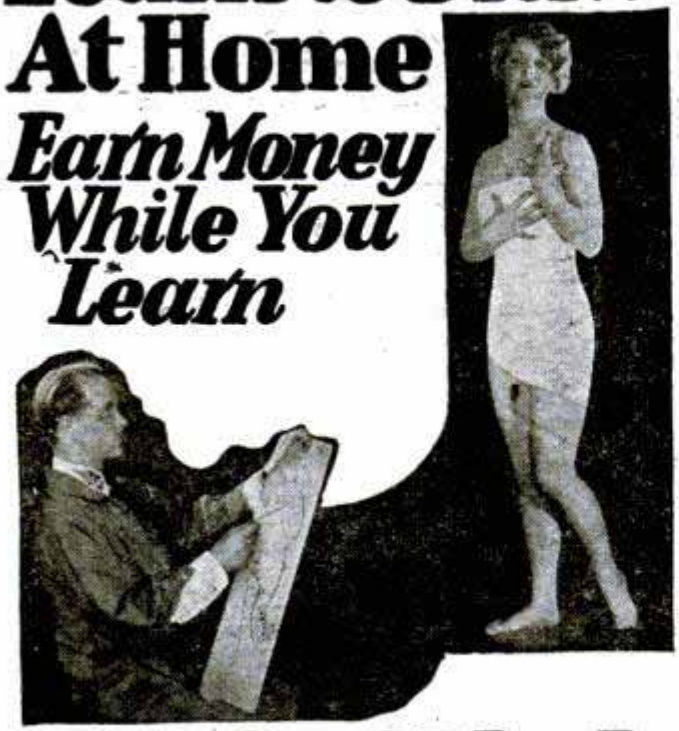

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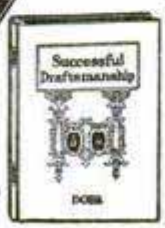

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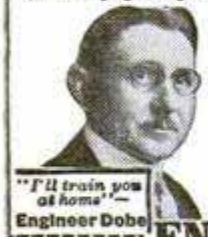

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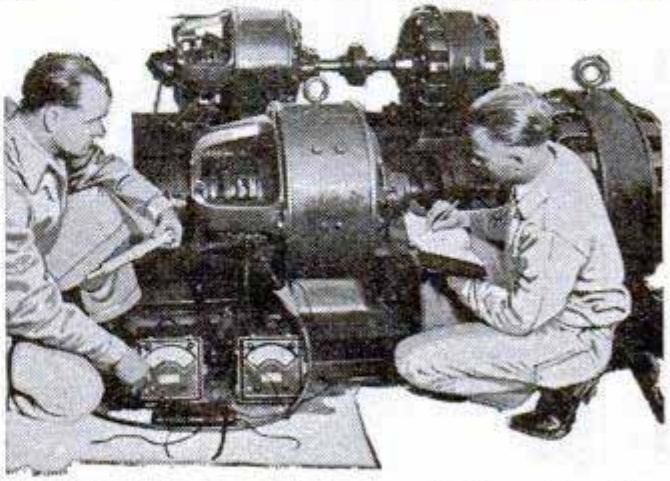

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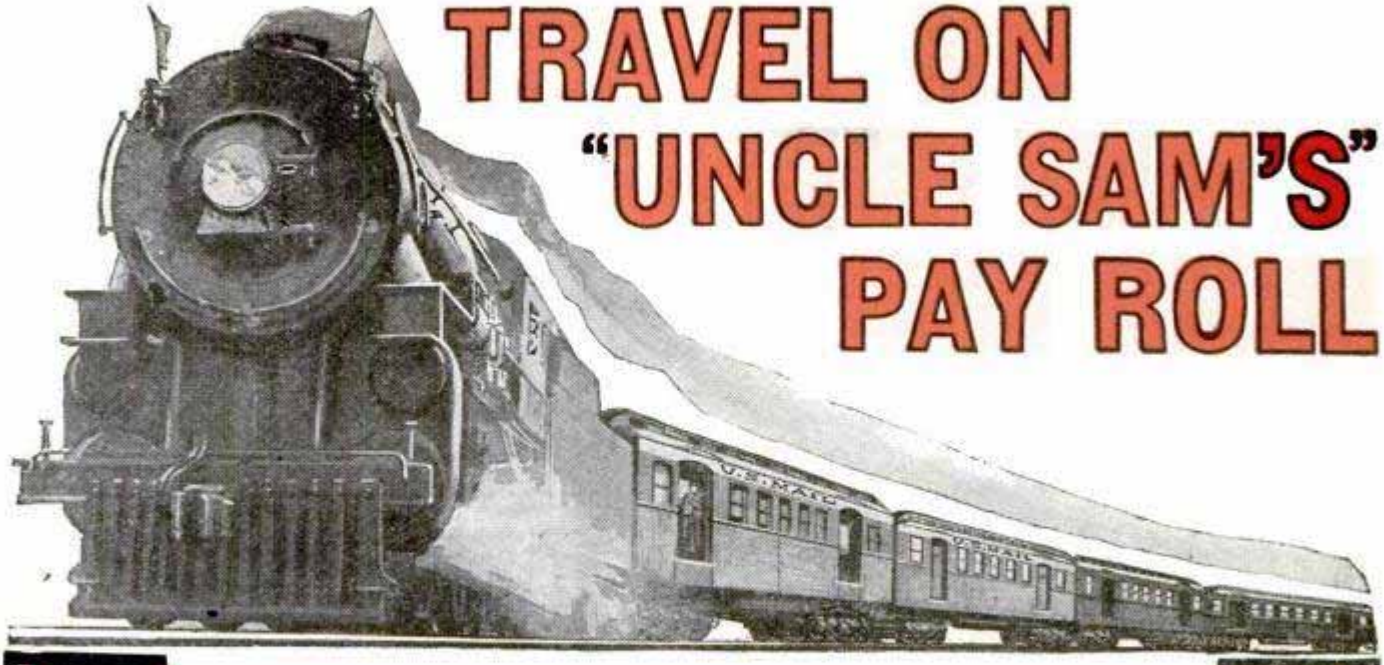

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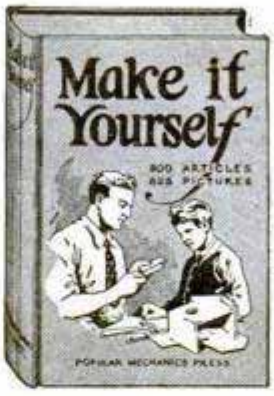

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In the radically different Eveready Layerbilt the cells are flat, and the battery is assembled under pressure into a solid block, eliminating waste space, packing a maximum of active materials within the battery case, and making those materials more efficient.

In the EVEREADY LAYERBILT we have put the holes to work

Radio is better with *Battery* Power

There is a kind of radio reception that is radio at its very best. Clear. Hum-free. True in tone, faithful. Reliable. Reception from a receiver that is working under exactly the conditions for which it was designed. For such reception, use batteries. For batteries provide pure D. C., Direct Current, the only kind of current that is silent and unnoticeable in radio. For utmost results, undisturbed enjoyment, and unalloyed delight, use Battery Power.

THE ordinary dry cell "B" battery is full of useless holes — waste spaces between the cylindrical cells. The wasted space may amount to more than 30 per cent of the total.

A number of years ago we set about correcting this state of affairs. Dry battery traditions were dropped. An entirely new kind of dry cell was developed. It was flat and square, like a book, instead of cylindrical. Such cells were pressed together into a solid battery block with no waste spaces. The new invention was patented, thus making it exclusively Eveready. The Layerbilt embodies the first radical improvements ever made in the construction of the dry cell.

But before this remarkable battery was ever sold, it was tested for several years in the laboratory. Then it was put on trial in home service in all parts of the country. Several remarkable things were discovered in this way. The most remarkable is this: In the Layerbilt from a given quantity of materials you get more current than you would if the same amount of chemicals were put in a cylindrical cell battery. The flat construction makes the active materials produce more current.

That is why the Eveready Layerbilt "B" Battery No. 486 is the longest lasting of all Evereadys. It is a heavy-duty battery for use on all loudspeaker receivers. Hundreds of thousands of people have found it to be the most economical battery they ever used. For convenience, as well as economy, use the Layerbilt.

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Illustrated to the left is the cylindrical cell type of "B" battery construction. Each cell is a unit connected to the others by soldered wires. The space between the cells is wasted, useless.

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East of the Rockies
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8 P. M., Pacific Standard Time
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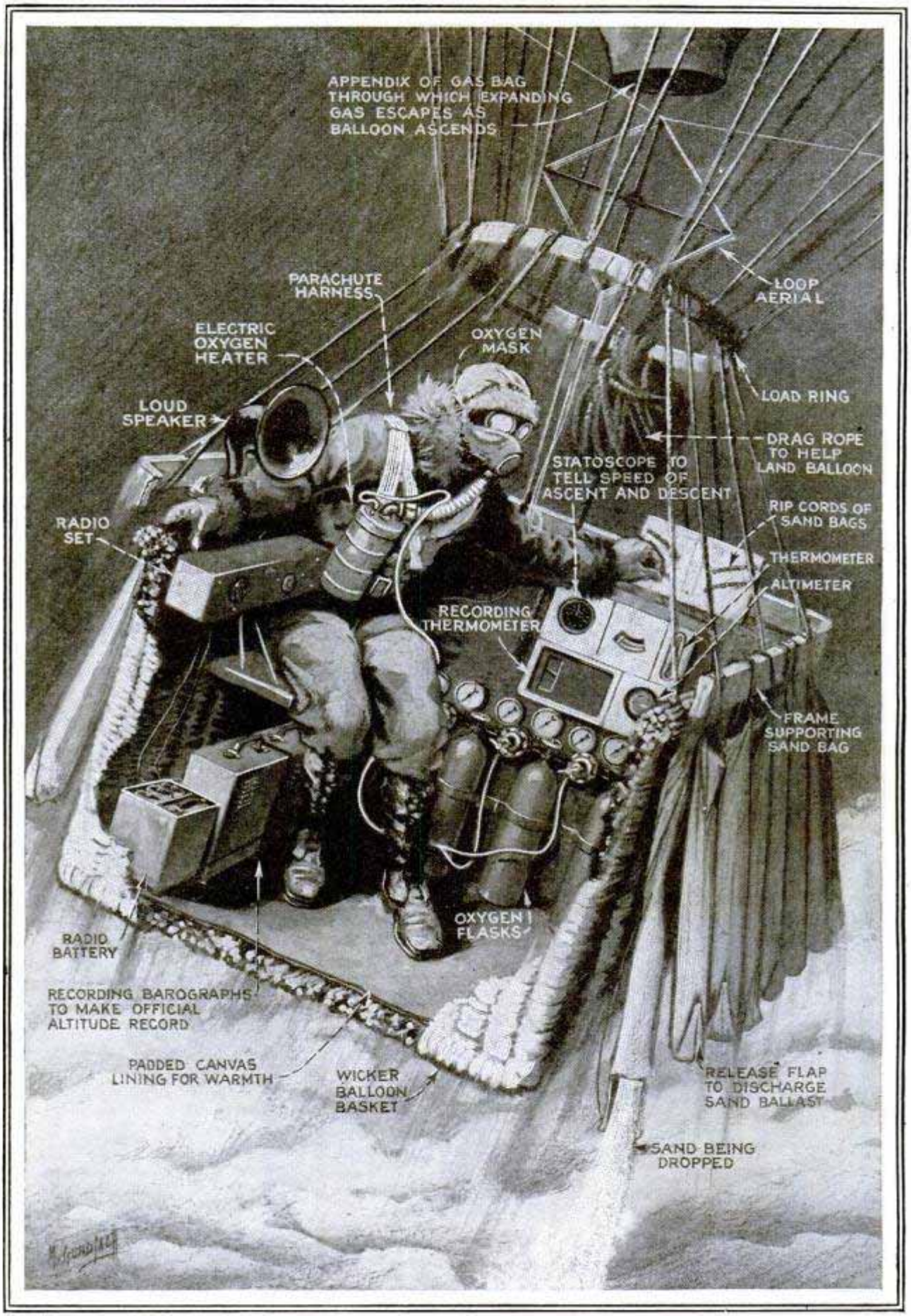

Captain Gray's High-Altitude Balloon Equipment as Used on His Last Flight; the Special Sand Bags, Opening like Parachute Packs When the Cords Were Pulled, Were His Invention

Popular Mechanics Magazine
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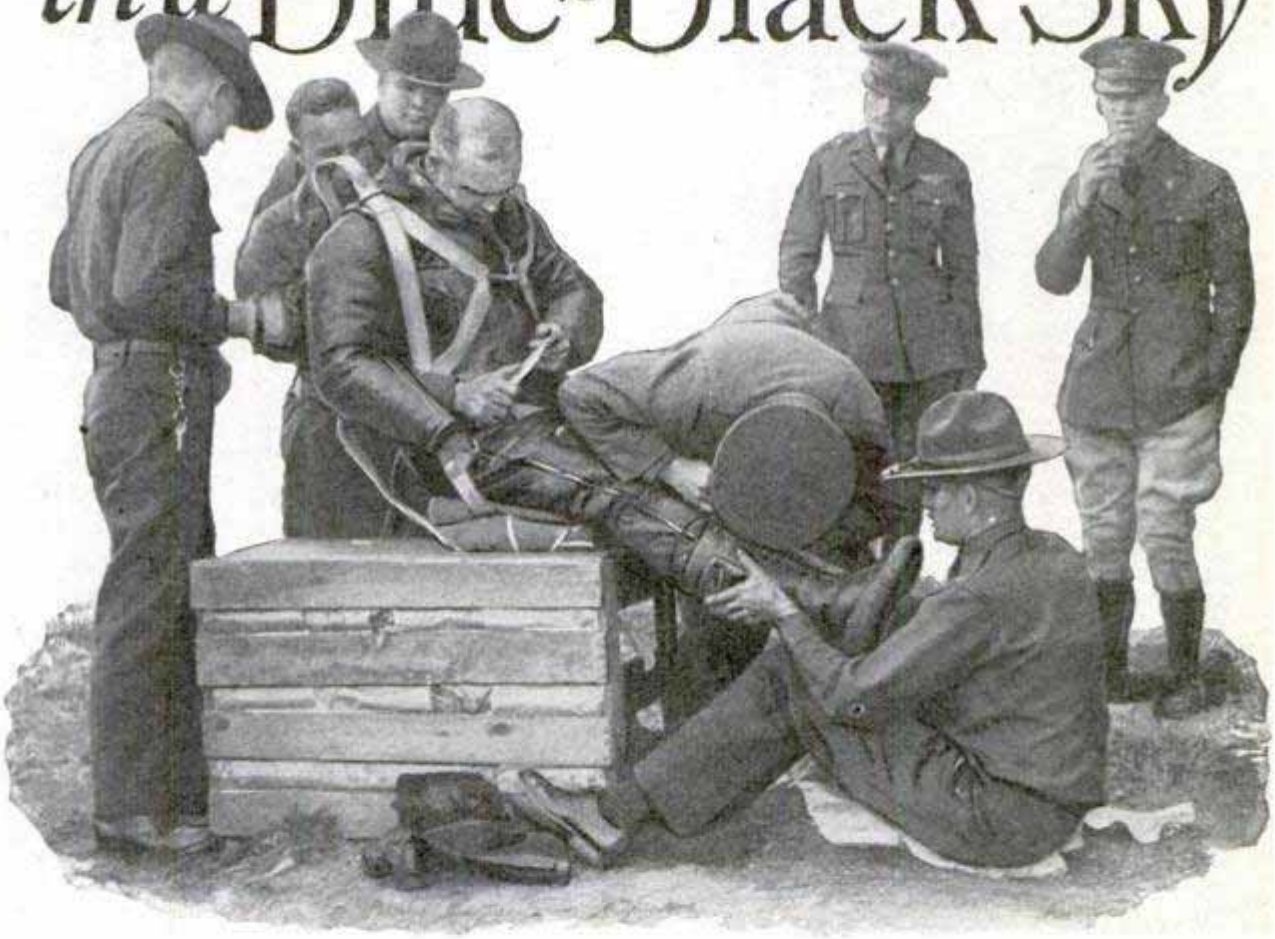
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 49 FEBRUARY, 1928 No. 2

3665

Battling for Life in a Blue-Black Sky



Capt. Hawthorne C. Gray, Who Passed the Eight-Mile Height, Higher Than Any Man Had Ever Been, and Then Died When Exhaustion Prevented His Opening a New Oxygen Valve

SOMEWHERE over the lower Ohio river valley, Capt. Hawthorne C. Gray, holder of the world's altitude record, died recently in one of the strangest accidents in flying history. He died, his recording instruments indicated, at the moment he had reached the earth's ceiling in a successful attempt to re-establish his previous record of 42,470 feet—more than eight miles—which was disallowed because he was forced to leave his balloon by parachute before it returned to earth.

A severed oxygen tube, cut by his own sheath knife as, with mind dazed and body weakened by the rarefied air, he struggled to cut loose a final piece of equipment to free the bag of a weight that would permit his balloon to rise a few more feet,

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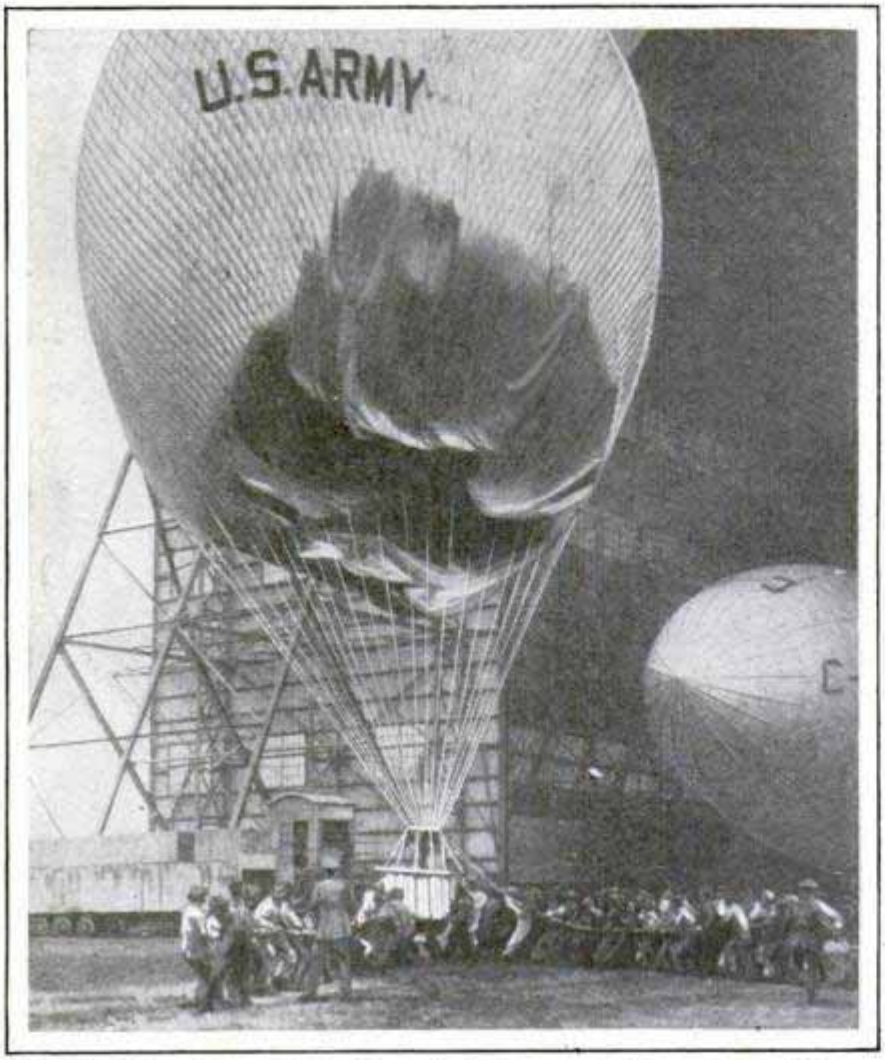


The Big Balloon Being Walked from the Hangar; the Nose of a Small Army Dirigible Is Seen in the Background

and a closed oxygen valve told the story of his death. The last entry in his log showed he had pulled the final release cord and dropped the last of his 4,700 pounds of sand ballast at 40,000 feet. That was at 3:15 p. m. The next morning a curious boy, climbing a tree to inspect the tangled balloon lodged in its top, found the flyer's body, still in the basket.

From the mute evidence of log and instruments and the cleanly severed ends of the life-sustaining oxygen tube, fellow officers from Scott field, the army balloon school at Belleville, Ill., pieced together the story of what had happened more than eight miles in the air.

Capt. Gray had taken off from Belleville at 2:22 p. m., followed by four airplanes carrying brother officers as observers. The planes circled around as the 80,000-cubic-foot gas bag shot upward. Around the wicker basket were grouped, on a wooden frame, a multitude of long cylindrical sand bags, their bottoms held closed by rip cords that centered on a small wooden panel in the basket.

Up through the clouds the balloon and planes climbed, and, at 12,000 feet, the aviators in the escort ships waved good-by and leveled out to hover along the cloud tops. The balloon continued to rise, drifting to the south before a fifty-mile-an-hour wind. At 15,000 feet, if he followed his usual practice, Capt. Gray tested his oxygen equipment and took several deep breaths of the gas, until he reached 20,000 feet and turned it on steadily.

The oxygen equipment consisted of three steel flasks, a gauge, connecting tubing, a helmet and chest canister, which made the outfit resemble a war-time gas mask. The canister, however, instead of containing purifying materials, was a double metal tube into which an electric heater had been built. The heater warmed the oxygen and helped make breathing easier.

At 30,000 feet, the silvery bag passed from sight of the hovering airplanes. From there on, his last link with the world was lost, save for his radio set, which he was in the habit of tuning in on some broadcast station in order that the cheerful jazz might relieve the monotony and act as a stimulant to the mind, which, in such rarefied air, is apt to wander and grow hazy. As the balloon pierced the last cloud bank, it entered a world that only two or three men have ever seen. The earth had disappeared from sight and with it, the dust particles of the air that make sunlight white. Above him the sky was a deep blue-black save for a brilliant ball of fire where the sun rode. The temperature was about seventy degrees below zero.

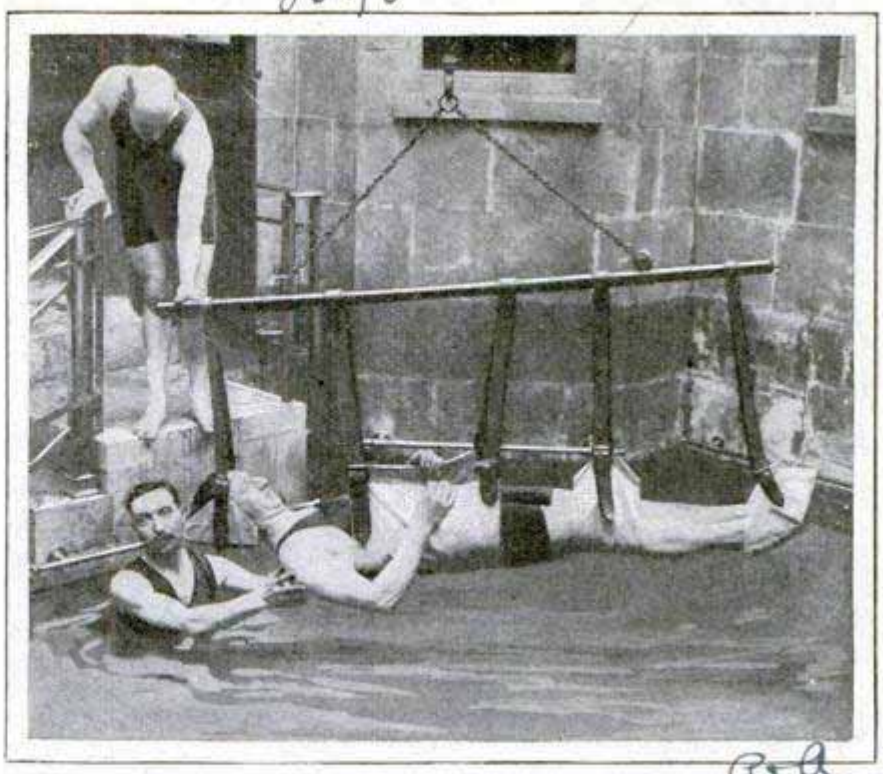
At 40,000 feet, his last entry in the log

shows, the final bag of sand was dropped. Unless something else went, the balloon could go no higher. The release of the frame supporting the empty sand bags would have been sufficient to send the balloon up another couple of thousand feet. Then, apparently, he decided to cut loose an oxygen tube and turn on another.

In rarefied air and breathing oxygen, men become so dazed that the hand will not obey the brain. Something of that sort apparently happened when Capt. Gray drew his knife and cut the rubber tube, for, after severing his link with life, he failed, either through exhaustion or because of his dazed condition, to open the valve of the second cylinder and death followed.

It is doubtful whether anyone will ever ascend higher than Capt. Gray, unless he goes up in an air-tight shell, for the test-chamber experiments of the army air corps show that somewhere between 40,000 and 45,000 feet is a point where even oxygen would fail to support life.

The army experimental laboratory designed an air-tight metal balloon car some time ago for Capt. Gray, but he never used it feeling it was more dangerous than exposure in an open basket. He pointed out that, while the air-tight car would keep him in air at ground-level pressure during a flight, it would make it impossible to leave the balloon by parachute, because the sudden transition to rarefied air would be almost instantly fatal, the body literally blowing up from the pressure within it.



Lowering Patient into the Bathing Tank in Special Sling; the Apparatus Saves Painful Lifting and Possible Injury of Subject

BATHING SLING FOR INVALIDS AIDS IN TREATMENTS

Sick persons, or cripples who are unable to walk, are given baths in an English health resort by means of a special sling apparatus which lifts them from their beds and permits them to be lowered into the water. It simplifies the work of attendants and assures greater comfort for patients.

WEIGHT DROPS FOR FIRE CALL TO PROTECT BUILDINGS

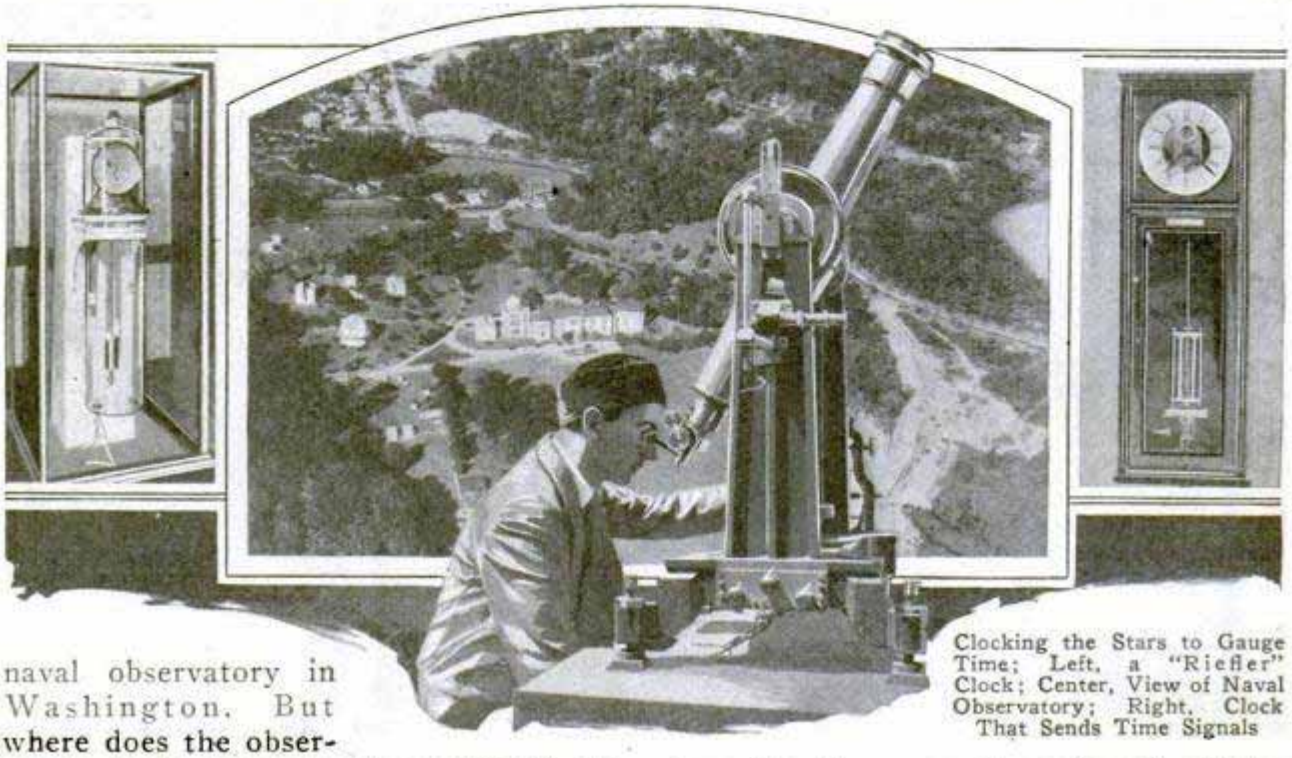
© Keystone View Co.

Part of the Control Assembly of Fire-Alarm System Which Functions by a Falling Weight

An automatic fire alarm, tested in London, sounds a number of bells and telephones for the fire company. It functions by the dropping of a twelve-pound weight. This is held by wires that melt when the temperature reaches 160 degrees. As the weight drops, it works a control box from which the signals are operated.

WHERE TIME BEGINS AND HOW IT IS SENT TO YOU

For all the tens of millions of clocks and watches in the United States there is one single regulating authority. It is the naval observatory in Washington. But where does the observatory itself discover a time which it can say with confidence is exactly right? The answer is: It goes to the one process in nature which repeats itself daily with unfailing precision—the silent, stately, never-varying march of the stars across the sky. Every night of the year when the sky is clear, an astronomer takes his station at the eyepiece of a transit instrument, which is a small telescope set in such a position that the light from a given star is caught at the precise split-second when it crosses the meridian, or the great circle that bisects the sky north and south directly overhead. From intricate calculations the observatory staff knows when the given "clock" star is due to make the transit of the meridian. When its light flashes down into the transit instrument they know that the exact calculated time has arrived. If their clocks show a different time, then the clocks are wrong. The stars themselves are never too early or too late. As a matter of fact, the clocks, being made of materials subject to wear and affected by temperature changes, etc., do tend to wander away from the correct time, though they are never "out" more than a small fraction of a second. The standard clocks by which the time of the United States is regulated are three in number. Each is set on a pier of solid concrete running deep into the ground, so that it will be unshaken by any tremors short of those of an earthquake, but is surrounded by a glass case. The three stand in an underground vault, in which the temperature and pressure are kept automatically at a constant mark. Only when absolutely necessary does an attendant enter this part of the vault, as the heat from his body might affect the clocks. As their pendulums swing back and forth, their motion is registered electrically upstairs, in the "time room" of the observatory. From there the impulse is sent to the government radio station at Arlington. So, when you set your watch by radio, you are getting your time almost directly from the stars with only two or three relays, which are supervised with extreme care by expert hands and eyes.



Clocking the Stars to Gauge Time; Left, a "Riefler" Clock; Center, View of Naval Observatory; Right, Clock That Sends Time Signals

QUICK-CHANGING AUTO WHEEL REDUCES TIRE WEAR

Made of aluminum and steel, a recently introduced auto wheel permits changing a tire in a few seconds. The rim is locked by four steel cams that extend through the spokes. These are controlled by a

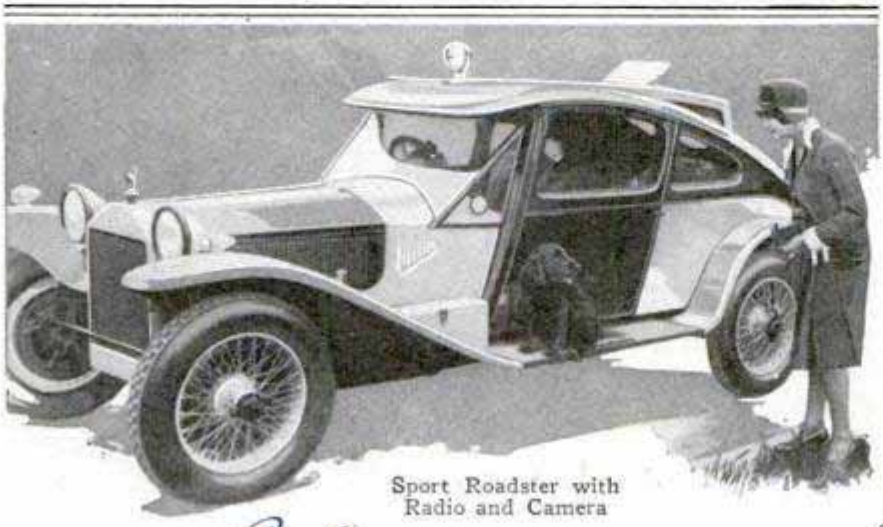
wrench at the hub. A quarter turn releases them so that the rim can be slipped off and a new one put on. This can be done in only one way, so that accurate alinement is assured with consequent easier driving and longer life for the tire.

GOLF REAL WORK SCIENCE FINDS

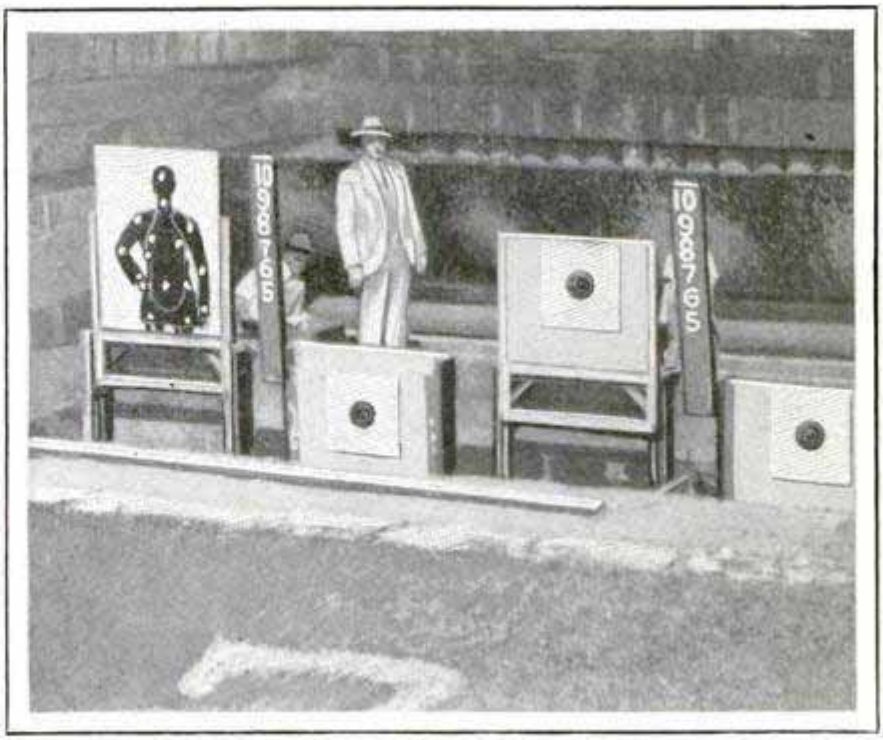
Measured on the basis of the energy expended, a man works about as hard playing three rounds of golf as he does in plowing an acre, scientists declare. He walks about four miles and makes, on an average, ninety-five strokes to one round of eighteen holes. Some time ago, a man played six rounds in one day or the estimated equivalent of two days of hard manual labor.

THIS AUTO HAS EVERYTHING FROM RADIO TO CAMERA

A sport roadster equipped with every possible accessory for a country tour—from a five-tube radio set to a camera—was one of the attractions at the recent British motor show. The car, which seats three passengers comfortably, has a modified "tear-drop" body and is finished in white and bright red.



Sport Roadster with Radio and Camera



Where Spent Bullets Are Salvaged for Reuse; Los Angeles Police Target Range with Lead Shield to Catch Projectiles

STEEL-BACKED PISTOL RANGE RECOVERS SPENT BULLETS

One of the outstanding features of a pistol target range the Los Angeles police have erected, is a steel bulkhead just back of the markers. It is so shaped that all of the bullets that strike it can be salvaged and used for reloading the cartridges, thus reducing waste and expense. The range is reported to have interested army authorities who are considering making similar installations for military use.

PARQUET FLOORING ROLLS UP LIKE CARPET

Plywood in thin sheets for the floors of show cases, shop windows and similar purposes, has been devised so that it can be rolled up like a carpet and removed. It is furnished in pieces a foot wide and three feet long and consists of two plies, one of oak or other hardwood on a backing of pine. The manufacturers assert that it will not become warped.

Open-Air Lion Cage in German City Where Circus Beasts Were Turned Loose for the Entertainment of the Townspeople

LIONS LOOSE IN PUBLIC SQUARE GIVE CITY A THRILL

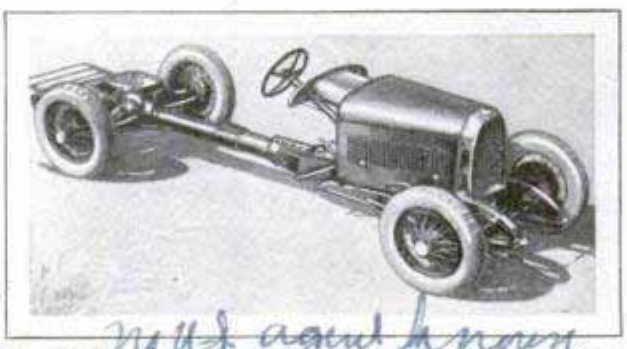
School children and others were given a thrill in Braunschweig, Germany, when twenty circus lions were turned loose around a lion monument in the public square. Steel caging was placed about the inclosure and, as a special precaution to prevent the animals from jumping over the barriers, a heavy netting was spread on top. The trainer performed his stunts to the delight of hundreds of pupils, who were dismissed from school for the occasion.

HIGHER-SPEED TRAINS

Development of a powerful type of "King" class locomotives on British railways has led to greater speeds and longer nonstop runs on some of the lines. A heavy train, hauled by the "King Edward VII," recently ran from Swindon to Paddington, a distance of seventy-seven and one-fourth miles in sixty-eight minutes. A still larger type of engine handles a 600-ton express train from London to Scotland, a distance of 400 miles, at an average of fifty-two miles an hour, with no stop in the first 268 miles.

"BACKBONED" AUTO CHASSIS REDUCES BODY STRAINS

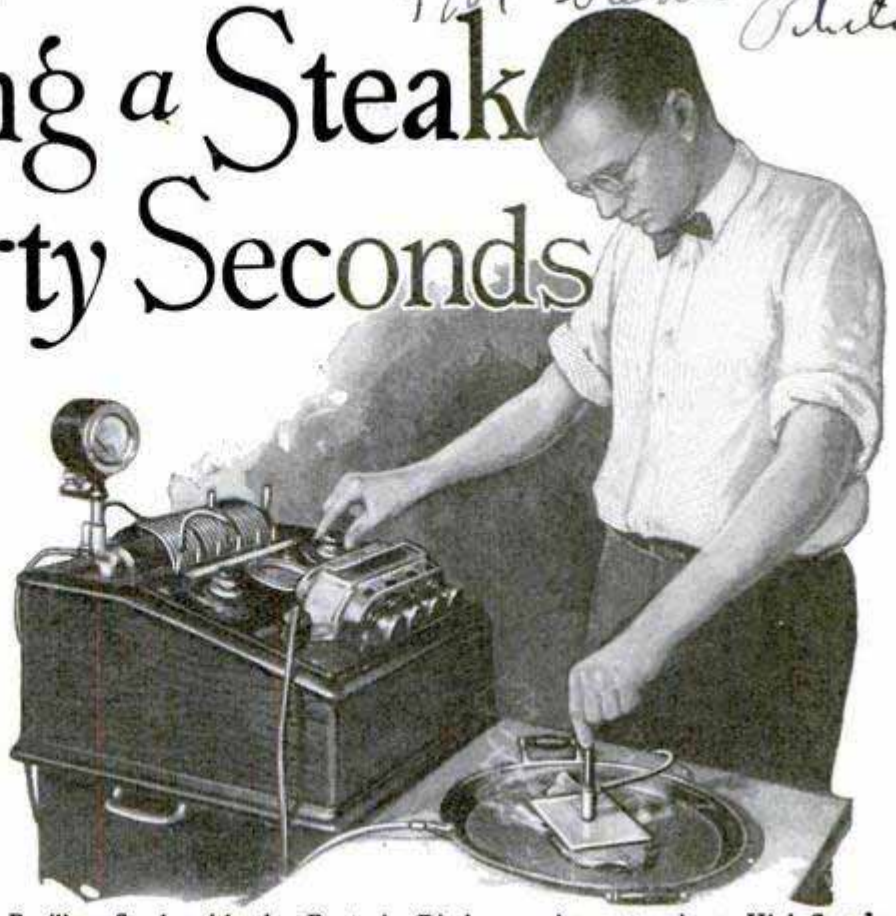
Instead of the usual built-up frame, the chassis of a foreign car, recently introduced, has a central steel tube, about ten inches in diameter. Inside it lie the transmission shaft and control cables for the brakes, while fittings are provided at either end for the necessary engine-mounting and back-axle units. Engineers declare that since this tube forms a "backbone" for the car, the body is not subjected to bending and other strains. This permits lighter construction, with greater ease and safety, even at high speeds.



Steel-Tube Auto Chassis Which Is Said to Reduce Strain on the Body and Permit Lighter Construction

3780 High Frequency apparatus
Leeds & Northrup,
4901 Stenton Ave
Phila.

Cooking a Steak in Thirty Seconds



Broiling Steak with the Doctor's Diathermy Apparatus in a High-Speed Cooking Experiment

USING the doctor's diathermy apparatus to cook the family dinner and completing the job in seconds instead of minutes or hours, is being successfully tried in England. Steaks are broiled in thirty seconds, eggs fried in two seconds and large potatoes baked to a delicious tender mealiness in fifty seconds.

The cooking apparatus is simply a high-frequency electrical machine, which passes several hundred thousand volts, at a frequency of a million or more cycles, through the food. Essentially it is no different from the electric knife used in the latest bloodless surgery, or the machine which generates heat within the body tissues to clear up lung congestion in pneumonia patients and relieve neuritis and rheumatic pains.

High Frequency Costs. June, 1921

A Quick Way to Bake a Potato, One of the Oldest of High-Frequency Electric Experiments

That high-frequency currents will cook is not a new discovery, for Tesla-coil experimenters were baking potatoes twenty years or more ago. But the English experimenters are working to develop the proper type of machine and fittings to make high-speed cooking practical in the home. If they succeed, electric cooking may become cheaper than coal or gas, for, while the average high-frequency apparatus has an efficiency of but fifty per cent, as compared with ninety per cent for good resistance-type heaters, the time element is so much in its favor that it more than offsets the losses. It takes about an hour to heat up an oven and bake a large potato, but if the same work can be done in fifty seconds, the cost will be no greater than burning an electric light for one minute.

The problem to be solved is the type and size of high-frequency generator to be used and the best type of electrodes for different forms of food. Using an electrode that is too small to broil a steak may cause the meat to burn, and one too

Hammond, Ind.

1 Small portable outfit $10.00
Frank S. Beta Co.

big will slow up the cooking, as it does not permit the necessary concentration of current in a small area.

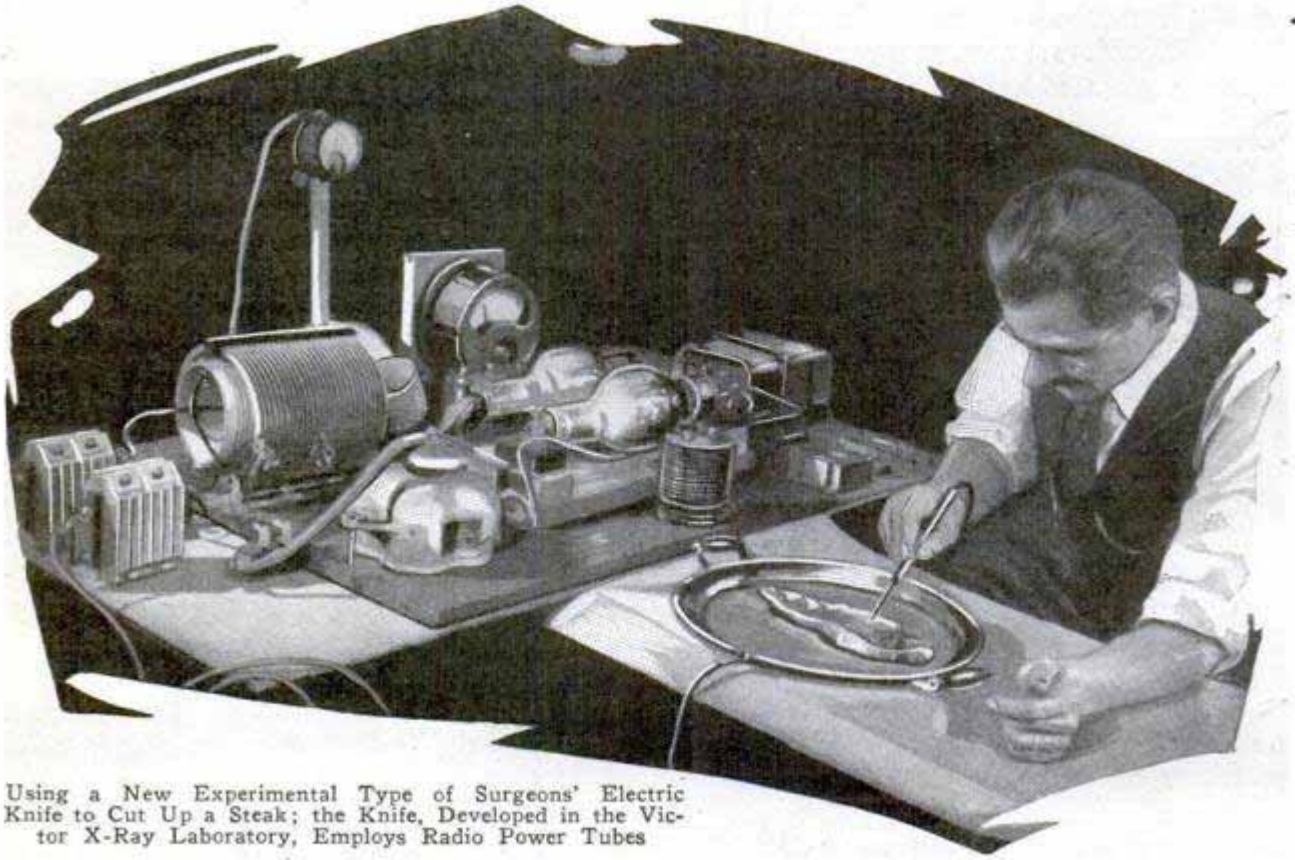
One striking advantage of high-frequency cooking, particularly of meats, is the equal distribution of cooking throughout the food. It eliminates steaks burned on the outside and too raw within, for the color, clear through the meat, will be exactly the same as the color on the outside. Neither the metal plate beneath the steak nor the electrode above it becomes hot, since all the heat generated is produced by the resistance of the meat tissues.

Potatoes can be baked by simply sticking a small electrode, or a piece of wire in either end. Eggs broken in a metal tray, which is connected to one side of the electrical line, can be fried by touching the other electrode to their surface. To hard-boil an egg in its shell, it is only necessary to stick a needle in either end, insert the wires and turn the switch. Actually the egg is not boiled, in the usual sense, for the current apparently coagulates the albumen by vaporizing its water current. The water, reduced to steam, will burst the shell within a few seconds.

American manufacturers of physicians' electrical equipment are rather doubtful that high-frequency cooking will ever become practical for the average home, though its novelty, or the nutritional value of the food or its taste, may overshadow all objections. Meat broiled in this way tastes entirely different from the usual steak, the taste being a cross between broiled steak and boiled meat, owing to the fact that it loses none of its juices and only a very small part of its fats.

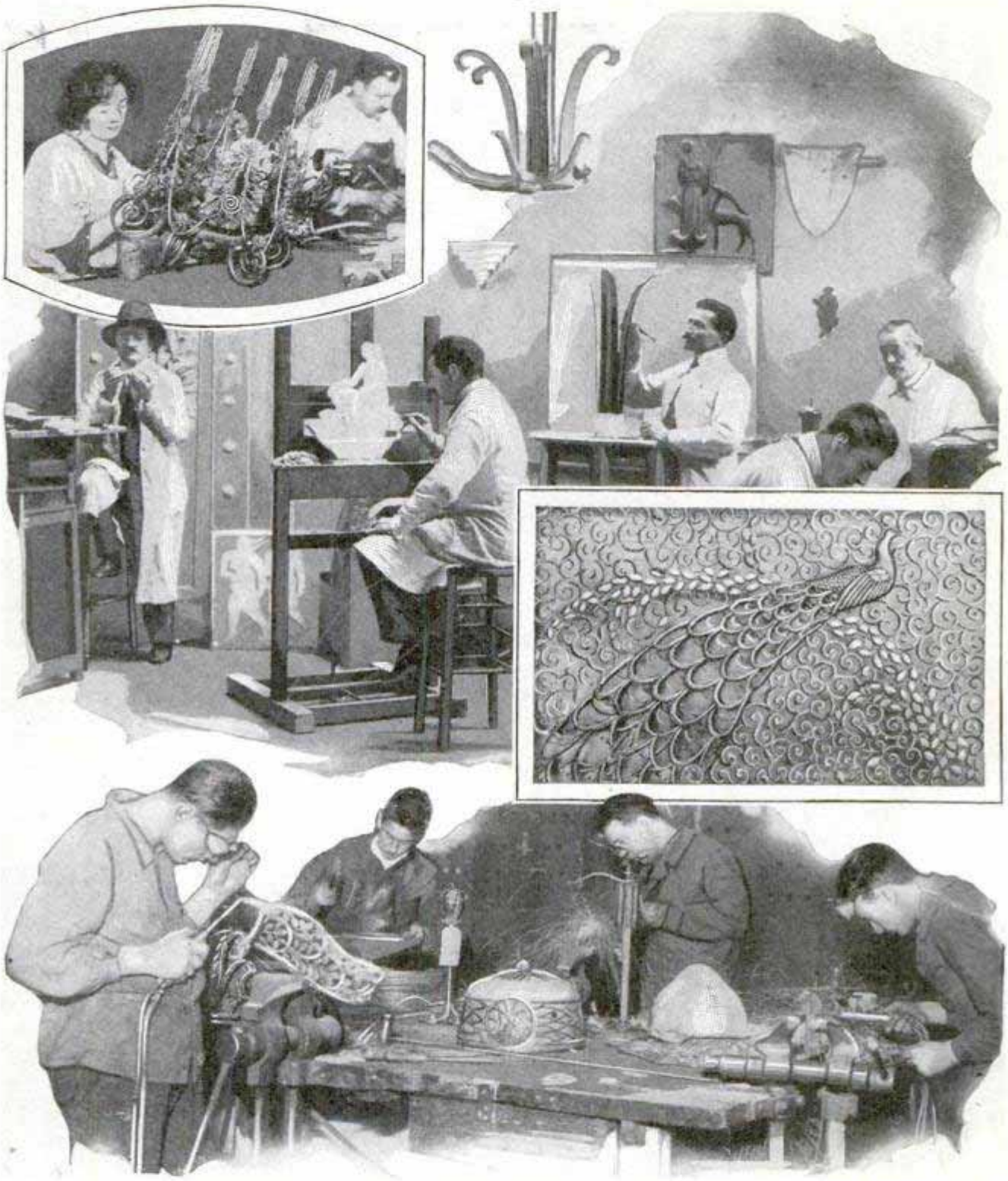
Some of the English experiments, reproduced in the experimental laboratory of the Victor X-Ray company, showed that almost any form of high-frequency machine will do the cooking. A new type of electric knife, still in the experimental stage, but ten times as powerful as any knife now in hospital use; a machine for treating pneumonia patients, and even an ordinary Tesla coil cooked successfully. The same current that does the cooking can be used to cut up the meat. The electric knife is not really a knife, though it may be fitted with a knife-shaped electrode. An ordinary darning needle or any small piece of steel will do as well.

The cutting is done by a small arc which precedes the tool. Apparently it parts the flesh through dehydration of a layer of cells. In hospital use, the heat is sufficient to cauterize the adjoining tissue and prevent bleeding.



Using a New Experimental Type of Surgeons' Electric Knife to Cut Up a Steak; the Knife, Developed in the Victor X-Ray Laboratory, Employs Radio Power Tubes

BEAUTY IN IRON IS WROUGHT FROM WAX MODELS



Below, Welding Delicate Pieces of Iron for Chandeliers; Center, Making Designs and a Fire Screen; Top, Left, Giving Iron Appearance of Old Bronze

Of all metals, forged iron lends itself best to decoration, for it unites strength with lightness. The artisan may form it to his fancy, for monumental doors, graceful stairway railings, elevator cages, fire screens, lanterns, lamps, chandeliers, wall sconces, as well as pretty baubles. Its tendency to rust makes it less desirable than bronze or copper for interior decoration, but paint and lacquer remedy this defect. Despite the progress made in the perfection of metal-working implements, the hammer still remains the indispensable tool of the iron craftsman. Even in important factories, which tend to replace more and more the blacksmith shops of

RADIO POLICE PATROL CITY OF EIGHTY THOUSAND

Berkeley Policeman in His Radio Car, the Headquarters Operator, and, Left, the Chief at the Transmitter

Equipping every policeman in a city of 80,000 population with a radio set, so he is in constant touch with headquarters, has given Berkeley, Calif., the world's most mobile police force, according to August Vollmer, its chief. Every Berkeley patrolman covers his beat by automobile, instead of on foot, which makes the radio system possible. Each car has a radio receiver, with a loud speaker mounted just beneath the steering wheel, and also headphones, if the patrolman prefers to use them. In addition there is a small red neon light in the wireless circuit, which can be flashed on and off by a telegraph key at headquarters. When the policeman leaves his car for any reason, he tries to keep one eye on the neon globe. If he is wanted, the operator at central station transmits the order in Morse code. Tests, according to Chief Vollmer, show the radio system works perfectly at speeds of fifty miles an hour, and that within three to five minutes the entire force can be assembled at the scene of an alarm. The wireless system works on 160-meter wavelength, and the receivers on the cars are built for that wave only.

REMOVABLE-HEAD AUTO PISTON SIMPLIFIES CHANGING RINGS

To introduce a new set of rings in an auto piston now on the market, it is only necessary to remove the cylinder head, unscrew two stud bolts and lift the piston head out. The unit, which is made of an aluminum alloy, does not score and is structually stronger than the ordinary kind, the manufacturers assert.

former days, the forge continues the professional laboratory. In the modern establishments, where the art is being revived, there exists a modeling studio where the designers and sculptors create models for ironworkers. The models are made with potters' clay or wax, after which the workers execute them in metal. The masterly achievement of the patient locksmith, Biscornet, of the thirteenth century, who forged the grill gates of the Cathedral of Notre Dame, Paris, represents perhaps the highest art of the metal workers of all time. After having finished the design, the artisan had to prepare and stamp the fifty-five motifs which decorate the scrolls, and by 807 weldings join these ornaments with the body of the grillwork.

CAMERA TAKES FOUR HUNDRED PICTURES AT ONE FILLING

Standard motion-picture film is used in a camera that takes 400 exposures on one filling. It is not for movies but for "stills," eight to the foot of film, and portions of the reel that have been exposed can be removed at any time for development. The camera has an effective lens, weighs but forty ounces, is securely housed in a bakelite case and will slip into the pocket. Each picture is an inch wide and an inch and a half long. They are sufficiently clear to stand considerable enlargement.

Compact Camera Which Uses Standard-Size Motion-Picture Film to Take 400 Exposures

One of the Contestants in Race in Which Auto Equipment Is Worn

TIRE-ROLLING RACERS WEAR AUTO EQUIPMENT

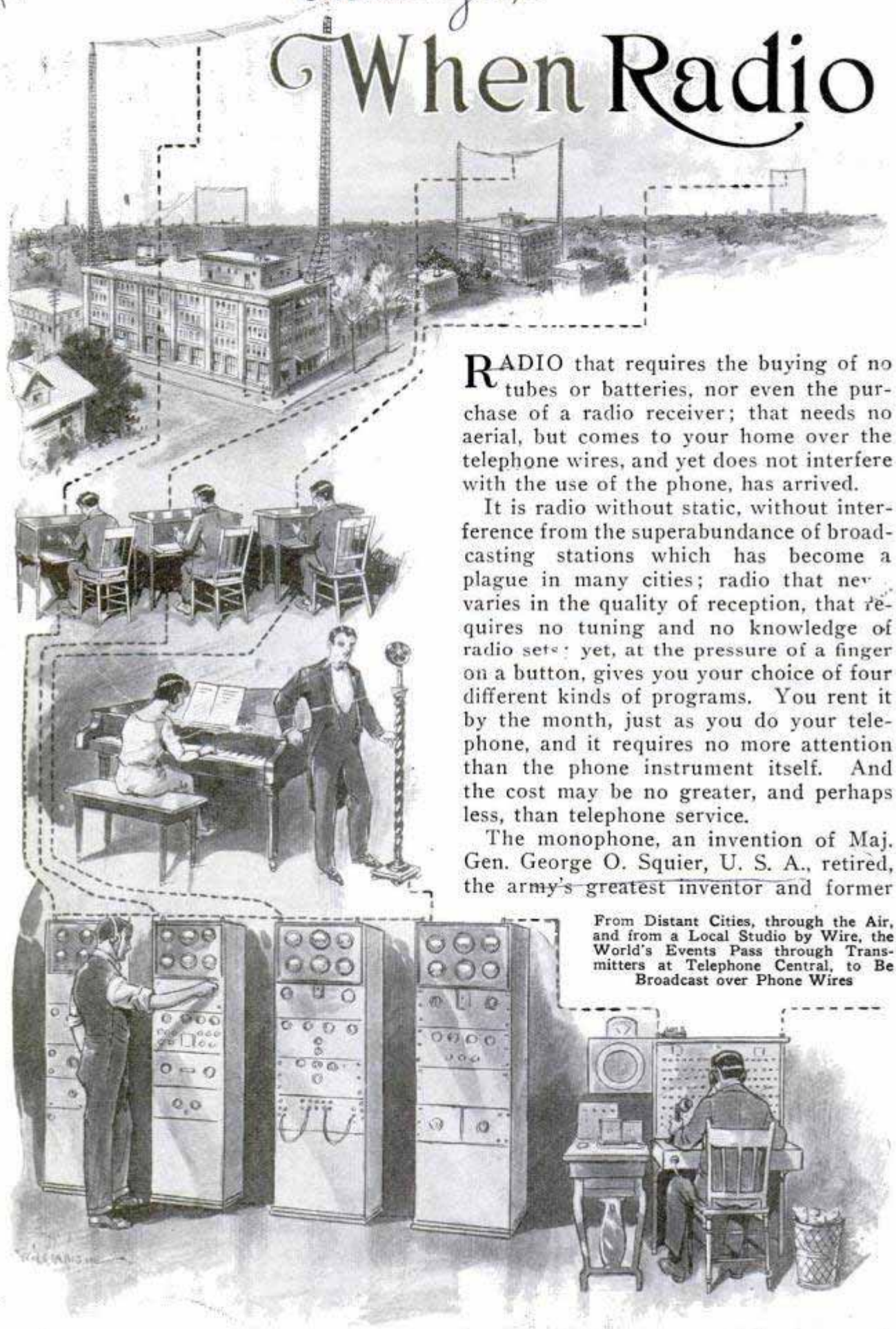
One of the features of an outdoor fete in England was an automobile-equipment race. Women were the participants and were required to wear various accessories, such as license plates, a horn and a pennant over the dresses, and, while running, roll a tire. Another requirement was to tie the pennant to the head and keep tooting the horn while the race was in progress.

PURIFY WATER BY ELECTRICITY INSTEAD OF DISTILLING

Purification of water by subjecting it to electric current is accomplished successfully and economically, according to reports, in a unit devised by German engineers. It somewhat resembles a collapsed steam radiator and is composed of a group of connected cells through which the water passes while the electricity decomposes various impurities that it may contain. The foreign matter is washed away, leaving the water almost as pure as that obtained by distillation, it is said. The purifier requires little current and needs no attention save an occasional cleaning of the walls of the cells.

Cont. Emmet Haugherty,
514 Woodward Bldg.
Washington, D.C.
3641

When Radio



RADIO that requires the buying of no tubes or batteries, nor even the purchase of a radio receiver; that needs no aerial, but comes to your home over the telephone wires, and yet does not interfere with the use of the phone, has arrived.

It is radio without static, without interference from the superabundance of broadcasting stations which has become a plague in many cities; radio that never varies in the quality of reception, that requires no tuning and no knowledge of radio sets; yet, at the pressure of a finger on a button, gives you your choice of four different kinds of programs. You rent it by the month, just as you do your telephone, and it requires no more attention than the phone instrument itself. And the cost may be no greater, and perhaps less, than telephone service.

The monophone, an invention of Maj. Gen. George O. Squier, U. S. A., retired, the army's greatest inventor and former

From Distant Cities, through the Air, and from a Local Studio by Wire, the World's Events Pass through Transmitters at Telephone Central, to Be Broadcast over Phone Wires

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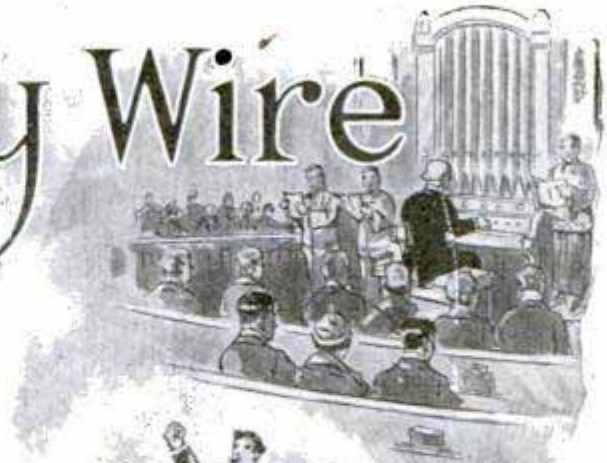
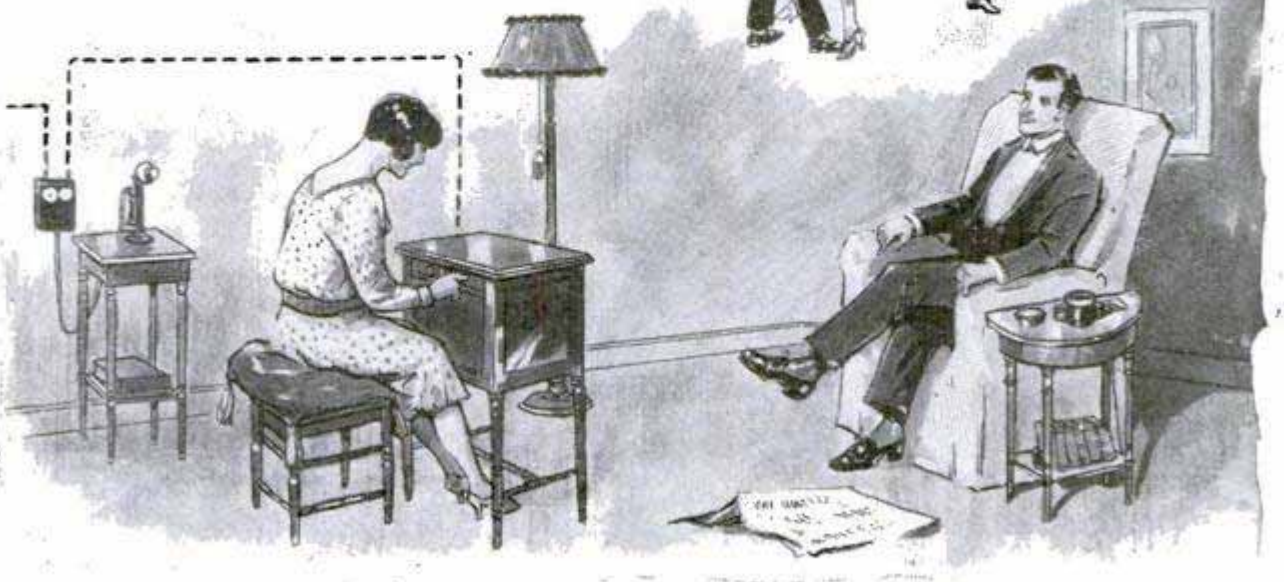
Comes by Wire



chief signal officer, makes it possible. It is the climax of his years of experiments with "wired wireless"—radio which is made to travel along the path of a wire, though without being put into that wire through any electrical connection. In effect, your aerial stretches all the way from your home to the telephone office, and the broadcast signals, instead of going out into the air, are picked up at their source by the phone-wire aerial and brought to you.

In your home is a loud speaker, concealed in a neat console cabinet of highly polished walnut. The speaker is of the latest "exponential" type, made of heavy cast plaster of paris to keep it free from vibrations, and with an air column forty-two inches in length. Above the loud-speaker grill, and almost hidden in the shadow of the overhanging top, are, from left to right, a small radio switch of the toggle type, four little push buttons, and a small knob that might have come from a radio rheostat. Three wires lead out of the back of the case. One goes to the telephone bell box, where it is attached to one side of the telephone line. One goes to the most convenient ground, which may be a water pipe or even the lightning-arrester ground of the telephone. The



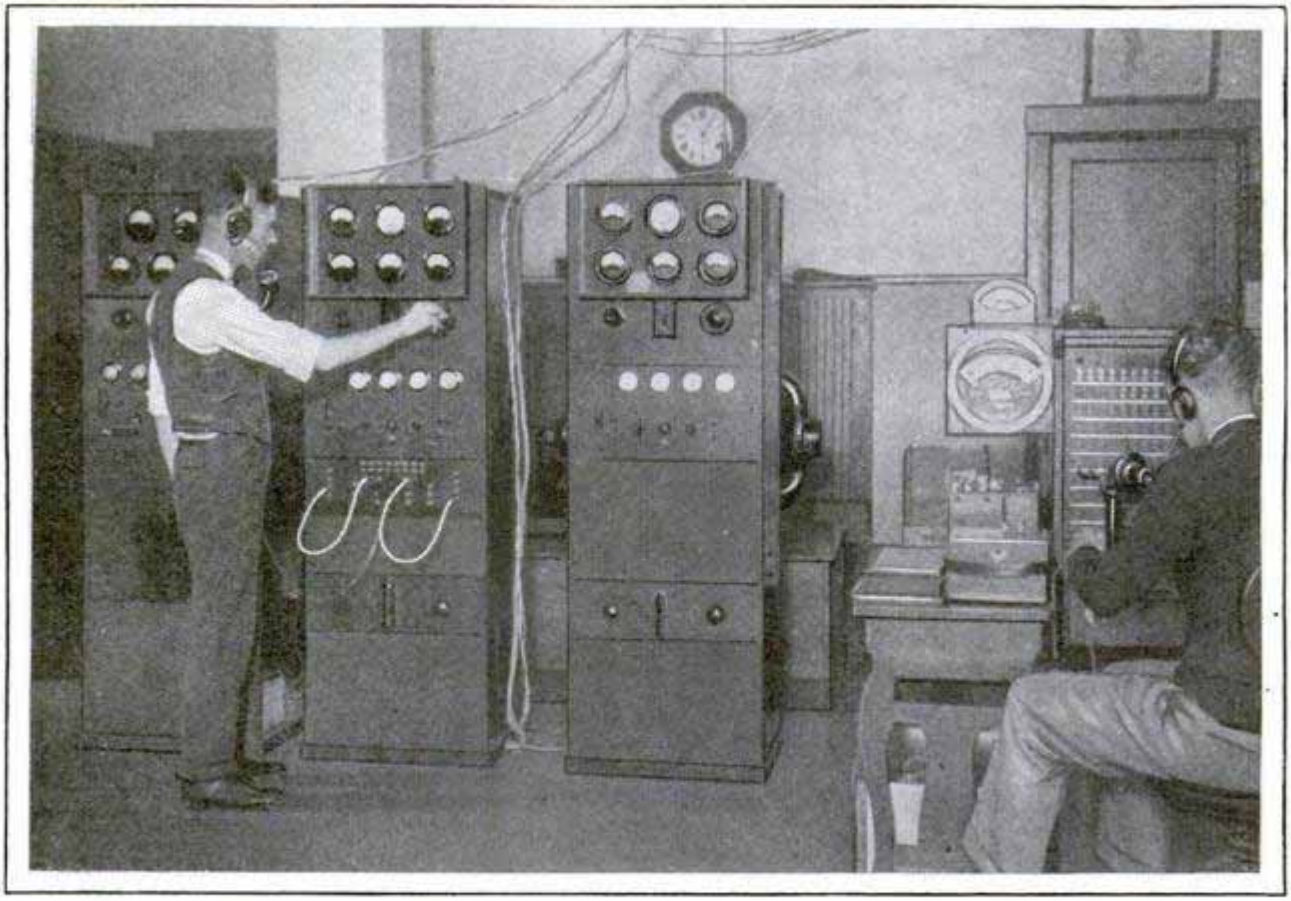
third is an extension cord that plugs into the nearest electric-light socket.

In operation you turn on the switch, push one of the buttons, and turn the knob to the desired volume—to the right to increase it and to the left to cut it down. If you want another program you push another button; each of the four brings in a different selection. One may furnish nothing but dance music; another provide classical music only; a third, educational talks, bedtime stories, children's hours, the day's news, time signals, and special features. The fourth may be used for popular programs of songs, semi-classical and popular music, playlets and other diversions.

Use of the monophone is not limited, says Gen. Squier, to the telephone. The electric-light company may enter the broadcasting field and furnish radio over the electric-light wires. One city, however, is already getting radio by telephone. The Kellogg Switchboard and Supply company, which furnishes the equipment for most of the 8,000 independent telephone companies in the United States, has developed it for use with the phone, and has installed the first equipment in Freeport, Ill., a county seat of 25,000 population, 110 miles west of Chicago. At the start the service is costing subscribers about $4 a month. George X. Cannon, general manager of the telephone company, estimates that, with 2,000 users, it may go as low at $2.

"For the present," says Mr. Cannon, "we will operate one studio to furnish local programs, and use powerful receiving sets to pick out of the air the best programs of distant stations, passing them on over our telephone wires to our subscribers. We have made a survey of the entire city with a receiver mounted on a portable truck, and found the point in the suburbs where radio reception is at its best. There we will locate our studio. People who live in parts of town where radio reception is bad, because of steel buildings, power lines or other causes, will be able to get just as good radio as those at the most perfect receiving point in Freeport.

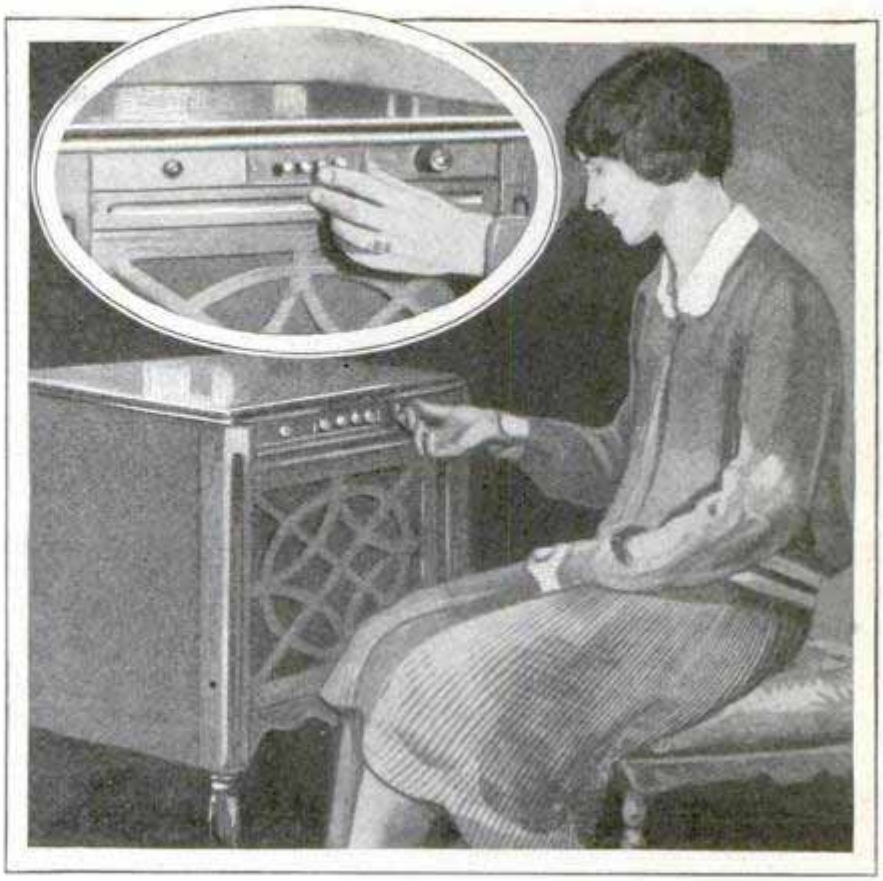
"The local studio will present 'home talent,' something Freeport has never heard on the air, as we have no local broadcasting station. The studio per-



Three Radio Transmitters, for Three Different Wave Channels, Installed in the Telephone Office at Freeport, Ill.; the Wires Leading Out at Top Connect with the Phone Cables

Материал защищенный авторским правом

formers will be supplemented by a number of portable microphones for use at other places about town. On Sunday mornings we will present one of the local church services. When the luncheon clubs have interesting programs, we will put them on the wired wireless. If there is a basketball game at the high-school gymnasium, graduation exercises or something else of interest, it will be picked up. Occasionally one of the local dance halls brings in a good orchestra from Chicago. When that happens, our microphone will be among those present. At regular intervals during the day and evening the local newspaper will go on the air with local and telegraph news bulletins. Even the city-council proceedings may be carried into the homes when matters of wide interest are up for discussion.



The Radio Receiver and Loud Speaker, and, Inset in Oval, a Close-Up of the Four Push Buttons, Switch and Volume Control

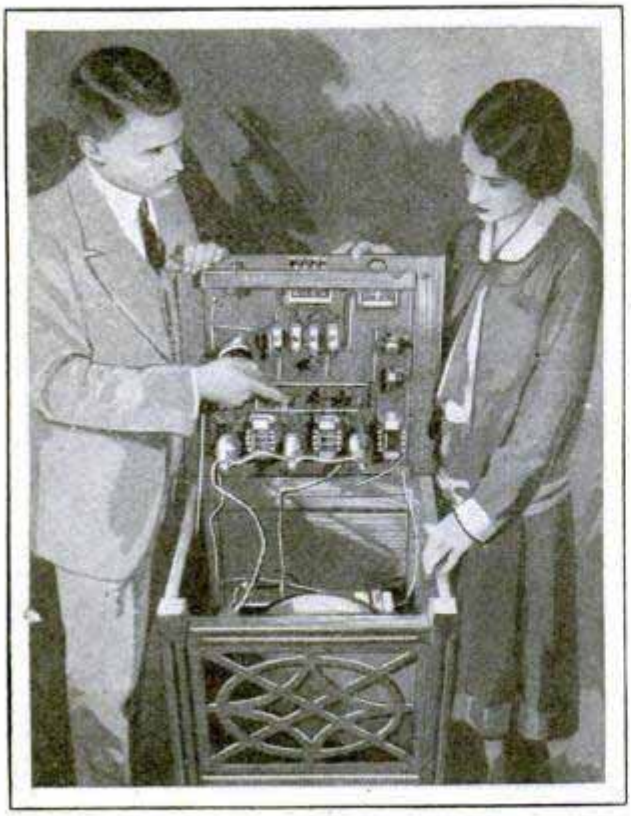
"Educational talks, of course, will be included, and, if the necessary royalty arrangements can be made, we will buy all the latest talking-machine records and use them to fill in at odd moments and during the earlier morning hours.

"That will take care of the local studio channel. Later, as the number of subscribers increases to produce more revenue, we expect to join one of the radio chains and bring the best of the national broadcast programs direct to Freeport by wire, instead of picking them up out of the air and rebroadcasting.

"The monophone is the first real by-product of the telephone business. Utilizing our existing wires and equipment, and without any great additional investment, we will be able to work up a good revenue-producing side line, and will be able to put quite a bit of the revenue back into the business of providing better programs."

The question of utilizing the telephone to bring radio into the home on a monthly rental basis has interested telephone men for several years. Three years ago, a phone company in Kansas installed a receiver in its exchange and began placing loud speakers in subscribers' homes. Several cities followed suit, notably St. Paul, Minn., where more than 1,400 loud speakers were installed. The system had two drawbacks. First, it was only possible to transmit one program, so the subscriber had no choice but to take what was offered by the operator at central. Secondly, special pairs of wires were needed, as the radio could not be carried over the same lines used for the subscriber's telephone, and the interest on the investment in special wires made the cost relatively high.

From the technical standpoint there was an even more serious objection. The receiver at central picked the broadcast out of the air, passed it through powerful amplifiers, and then put this audio-stage current onto the wires. The result was "cross talk" in the cables, and leakage of the radio onto the ordinary phone wires, so that interference with telephone conversations was caused.



What the Subscriber Doesn't See in the Sealed Cabinet: a Complete Three-Tube Radio Set

The Squier system, as developed in the Kellogg laboratories, gets away from all these objections. The transmitters, instead of operating on the usual broadcast wave bands, are extremely long-wave sets, utilizing waves far above even the code bands used for commercial wireless transmission. Because of their wavelength, and correspondingly low frequency, they interfere neither with the telephone nor with other wireless broadcasting. And instead of bothering about leakage in the cables, the system courts it. At Freeport, the telephone wires enter the exchange in big lead cables, each containing 400 wires—200 pairs, as the telephone man calls them. Only one pair from each cable is connected to the battery of transmitters, a separate transmitter for each of the wavelengths being used. The current from this one pair saturates the other 199 in each cable as thoroughly as though there was a direct electrical connection between them. There is no investment in wires tied up, for all the 200 can be used for ordinary telephone conversations.

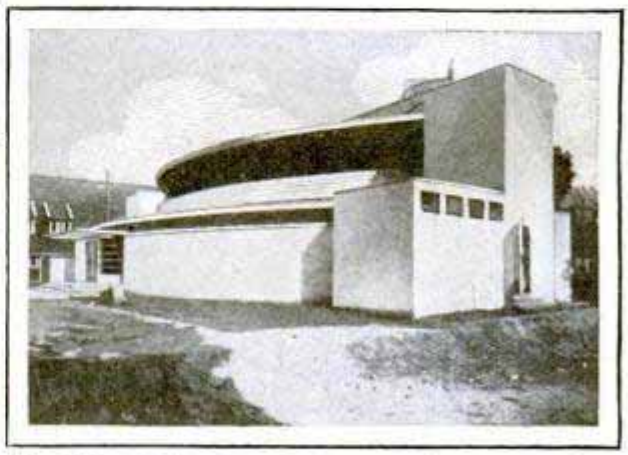
The signals sent out over the system are not the audio-frequency, but the radio wave, which gets away from "cross talk" troubles, and the radio wave is amplified and converted by a receiver built into the loud-speaker cabinet in the home. The receiver used is a three-tube outfit, utilizing alternating-current tubes, heated by attachment to the electric-light wires. A B-eliminator completes the electrical equipment of the set. There is one detector tube and two stages of audio, the second using a power tube. A special long-wave coil is used to pick up the low frequencies, and fixed condensers, switched in or out by the tuning buttons, take care of the changes in wavelength.

SUNSPOTS AFFECT WEATHER AS MOON DOES TIDES

The relationship between the weather and spots in the sun is as close as that of the moon and the tides, according to Father Jerome S. Ricard, of the University of Santa Clara. He points out that the northern sunspots give observers knowledge of the prospect of storms over the Pacific and Atlantic coasts while southern sunspots give the dates of the advent of counterstorms over the same coasts. The spots are carried around in the sun in about twenty-seven days and the storms circle the earth in the same time.

CHURCH SHAPED LIKE STADIUM HAS GOOD ACOUSTICS

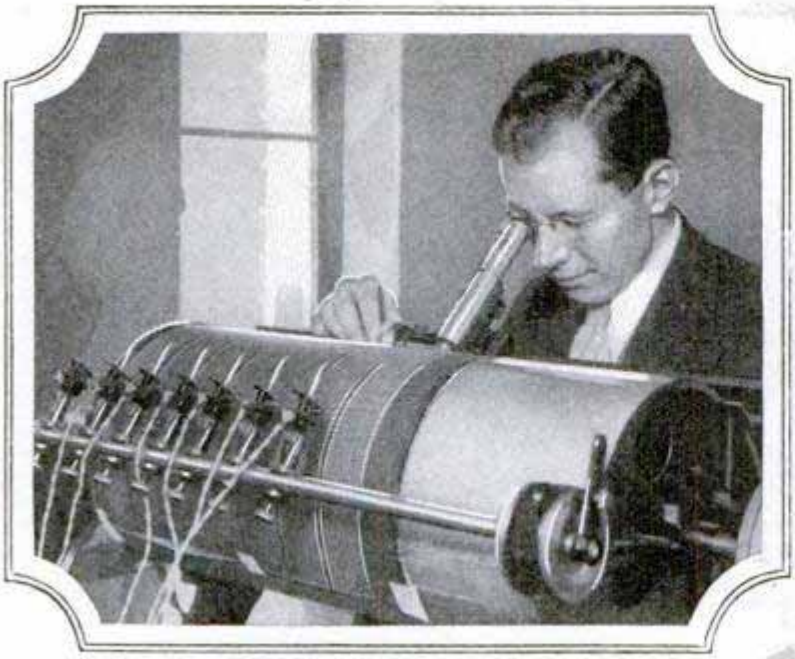
One of the most interesting structures in Amsterdam is a church of odd architecture. It somewhat resembles a stadium, having a deeply curved side, and is arranged to afford a lecture hall with satisfactory acoustical conditions.

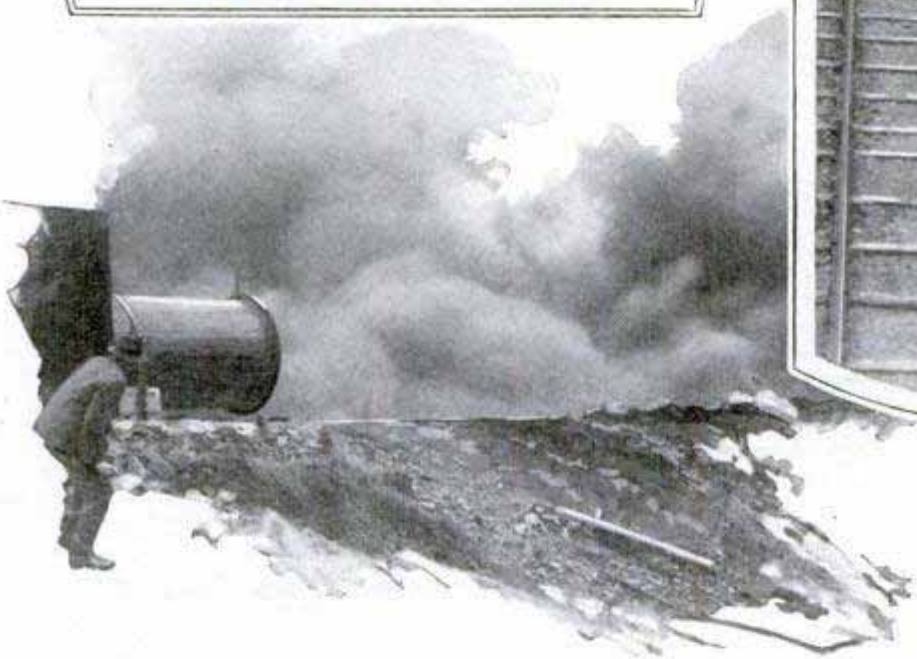


Church in Which Exterior Beauty Was Sacrificed for Service; It Houses a Roomy Lecture Hall

3697 Safety in Mines Research Station, at Harpur Hill Buxton, England

MAN-MADE DUST EXPLOSIONS AID MINE SAFETY





Reading the Record of the Speed of the Explosion, Connecting Instruments Used in the Big Test Tube and the Mouth of the Chamber at the Instant the Explosion Occurred

Interesting experiments to determine the cause and effect of dust explosions in mines are being made in England. The apparatus used is a long steel shaft, essentially a gigantic test tube, which is exploded electrically and the effects measured with special instruments. The time required to fire the fumes can be determined, the force of the explosions and other factors. Some of the tests have shown that the speed of the explosions ranges from 3,000 to 4,000 feet per second.

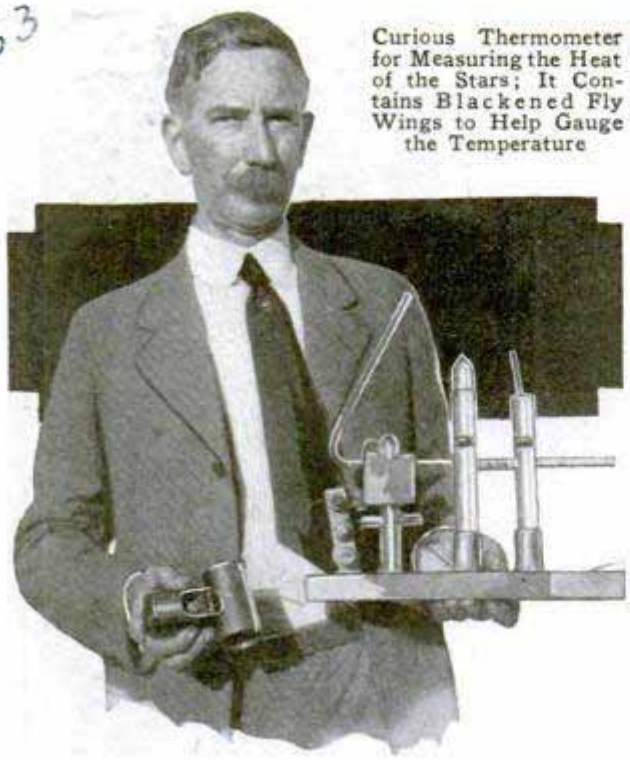
3735

PAPER FIBER FOR FURNITURE ALSO WOVEN IN RUGS

By twisting a form of paper into round shape, smoothing and polishing it by various processes, then weaving it, a serviceable substitute for reed has been devised in the manufacture of furniture and rugs. Approximately 50,000 tons of this material are now used yearly in the United States alone. A wide variety of articles can be made with the fiber reed and at lower costs, largely due to machine methods. According to reports, the introduction of this paper product has not hurt the sale of rattan or similar kinds of furniture.

National Fiber Products Inc.
Drexel Bldg. Phila.

FLY WINGS GAUGE STAR HEAT ON DELICATE INSTRUMENT



Curious Thermometer for Measuring the Heat of the Stars; It Contains Blackened Fly Wings to Help Gauge the Temperature

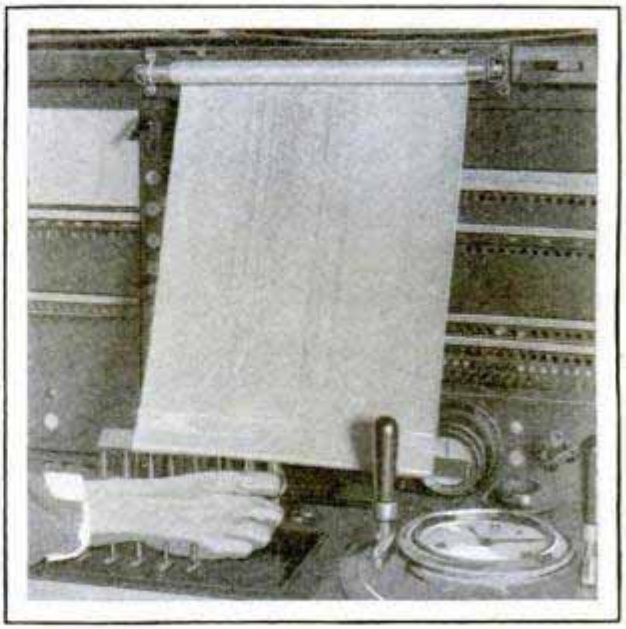
Heat from the stars can be measured and one of the instruments used to do it contains fly wings in the shape of a tiny "vane" suspended from quartz fibers in a small mirror. When a ray of starlight, passing through a prism, is trained on the blackened wings, the vane turns the fiber and the amount of the turn is registered by the mirror that reflects another beam of light along a calibrated arc.

BOYS TRAINED FOR LIFE AT SEA BY SHIPPING-BOARD SCHOOL

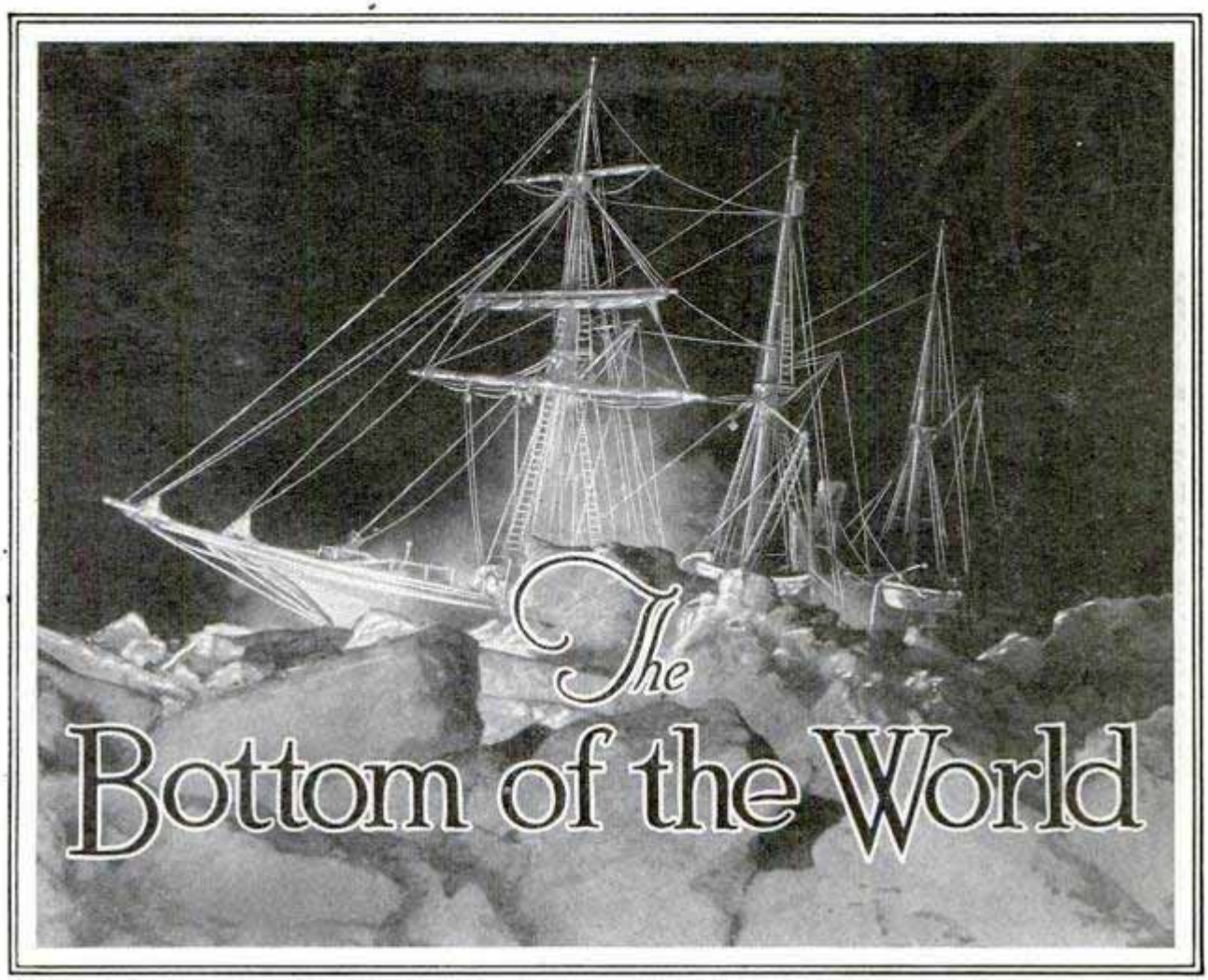
American boys with a taste for the sea have been afforded a thorough training system by the United States shipping board. Last year, more than 1,000 young men between the ages of 18 and 23 were introduced to the merchant marine for this special schooling. They are classed, at first, as student sailors. There are no classrooms and no theoretical instruction through correspondence or other means. Each boy learns his job by working with the men of the regular crews. They are scattered over the entire fleet of government-owned ships. In this "university," covering the seven seas and touching all ports of the globe, the boys are under the watchful eyes of the officers of the vessels. Masters and mates have been given orders to see that the training is thorough and that the teaching is not passed along to subordinates. Instructions state that every shipping-board vessel shall carry two students, known as deck boys, taking the place of one ordinary seaman on the crew payroll. The deck boys must be Americans of good physical and moral character, and the training such as to fit them for the higher ratings of ordinary and able seamen and ultimate advancement to the rank of officers. The real meaning of the system is that the boys shall be eligible for promotion as mates or captains. Six months of service as deck boy, at $25 a month, brings promotion to the grade of ordinary seaman at $47.50. This is followed by further advancement to the grade of able seaman at $62.50. The next upward step is an appointment as third mate with pay at $140 to $150 monthly. From this point, the promotions may come as rapidly as ability dictates. The boys are fed with the crew and have shore leave in foreign ports.

PHONE RATES ON ROLL CURTAIN SAVE HANDLING BOOK

Mounted on a curtain roller, a rate guide saves the telephone operators time and trouble when looking up long-distance tolls. It is always in position for reference, is out of the way when not needed and is protected from damage.



When the Operator Wishes to Refer to the Rate Card, She Simply Pulls Down This Roller Chart



The Bottom of the World

Photos © U. & U.

Sir Ernest Shackleton's Ship "Endurance" Caught in the Ice, Shortly Before She Was Crushed; His Trip Back to Civilization by Open Boat Is an Epic Story

R.2307 130 W. 42nd St. New York. ~~3683~~

By J. OLIN HOWE

THE earth's most remote realm of mystery and silence, the great land mass about the south pole, is to have its age-long secrets laid bare. What is at the south pole? And what startling discoveries may come to light in that vast unknown continent in the midst of which the pole is located, a supposedly dead and barren area twice the size of the United States, where frost is king? Next summer Comm. Richard E. Byrd and a group of American scientists, aviators and others will sail south hoping to find out.

This isolated section of the world has been viewed by three small parties of humans on hasty dashes for the south pole. Our knowledge of it is very limited. Those who go now face well-nigh insurmountable difficulties in their attempt to penetrate nature's hidden places behind icy mountain ranges and across blizzard-swept plains at the bottom of the world.

Byrd himself plans to fly over the pole and to make other flights across and about this mysterious continent, and, with others of his expedition, will explore it as thoroughly as may be from the air, from aboard caterpillar tractors or by the use of sledges drawn by dog teams.

In the immediate region of the pole, the airmen will look down on only snow and ice—a scene of sheer lifeless desolation such as one might imagine upon the face of the moon—and their planes will be tossed by the most violent and tumultuous winds that blow upon our planet. Amundsen and Scott, who reached the south pole, and Shackleton, who almost made it, agree on this.

Amundsen was first to reach the pole—and not till as recently as 1910—traveling by dog sledge from a base on the antarctic coast on its New Zealand side. Gales and blizzards of titanic force hampered him,

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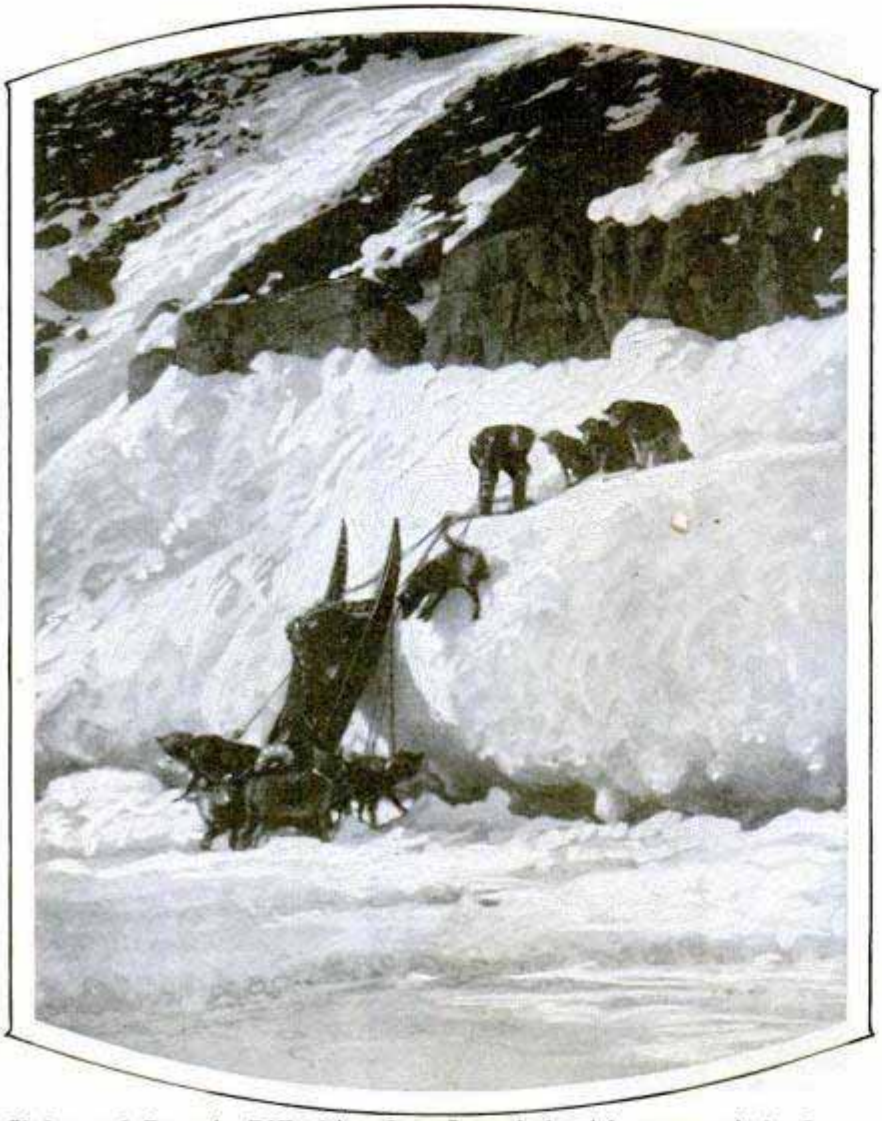

Sledge and Dogs in Difficulties, Just One of the Adventures of the Lauge Koch Expedition to Northern Greenland

but his journey to the pole and back was far less arduous than that of Scott, who a month later planted the British flag at the pole, only to perish on his return trip with three companions within a hundred miles of his main base.

What little we know now supports the idea that no life exists on the antarctic continent after one has left the coast a few miles behind. Yet, but for these three explorers, the only visitors there have been whaling captains and other sailors, who have merely landed during the short summer, which corresponds to our winter. These have found the hardy penguin, an odd mammal-like bird which stays on through the winter and lays its eggs in the snow, exceedingly numerous. For a few short weeks certain species of gulls are there too, and the waters abound in seals and whales. But soon all but the penguin are gone. Upon the land only fungi and lichens grow in scattered places. A lone queer insect has been found in the interior, but there is nothing to show that there is a single worm, mollusk, reptile, bird or mammal there. This because there is no known vegetable life without which animal life cannot exist.

The antarctic never has the extremes of temperature of the arctic, where winter's 70 or 80 degrees below zero. centigrade, are followed by summer days sometimes uncomfortably hot, and great herds of musk oxen may graze on green pastures for weeks. The soil on Antarctica seems never to thaw sufficiently for seeds to germinate, for here no summer day finds the mercury much above freezing.

Yet, is this mystic land at the southernmost tip of the world, the seventh continent upon its face, so nearly lifeless? Does death rule in Antarctica? We do not know. Byrd thinks not, nor hesitates to say this.

"Does it seem reasonable," asks the man who first flew to the north pole and last summer winged his way to France with the first multi-engined plane to cross the Atlantic, "that lands which for months of the year are swept by sunshine twenty-four hours a day should not somewhere support life? Not on the great plateaus which stretch out inland to the pole; here there is only snow and ice. But somewhere in those tremendous areas there must be lowlands where temperatures rise sufficiently to permit vegetable and animal life—the latter very possibly as different from any we know as the penguin is different from birds of climes with which we are familiar.

"In some antarctic valley, perhaps, shut in by towering mountains, a thrilling discovery may await us. We may find forms

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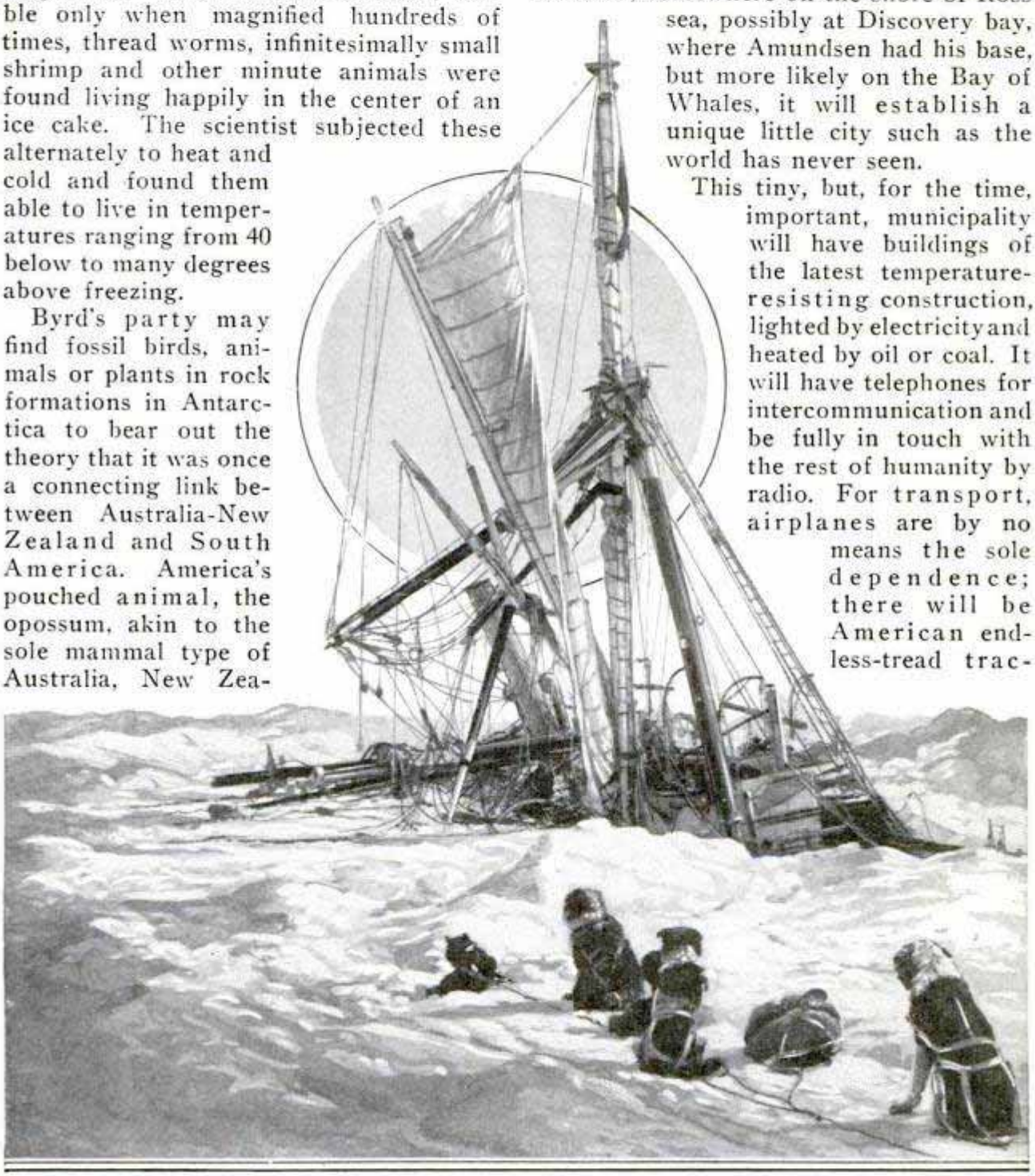
of life completely new to us. Who knows what link with prehistoric times might be there? If the elemental and sturdy penguin can live through the extremes of winter, in warmer lowlands there should be animals able to do the same."

Curious discoveries of James Murray, biologist with the Shackleton expedition, bear on Byrd's theory of life in Antarctica. In weeds in the bottoms of lakes, in the ice itself, Murray found abundant microscopic life. Small bearlike animals, visible only when magnified hundreds of times, thread worms, infinitesimally small shrimp and other minute animals were found living happily in the center of an ice cake. The scientist subjected these alternately to heat and cold and found them able to live in temperatures ranging from 40 below to many degrees above freezing.

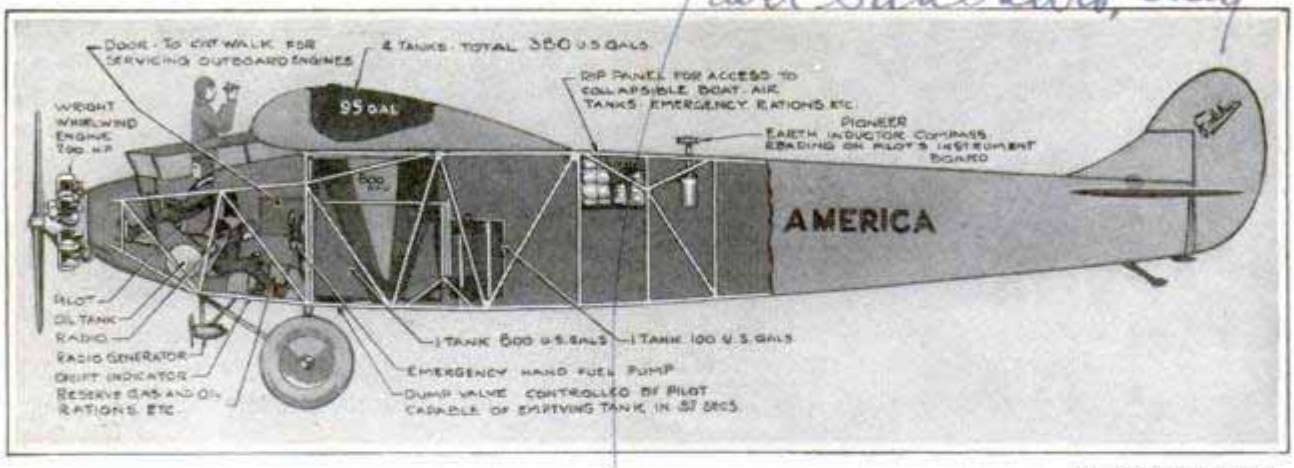
Byrd's party may find fossil birds, animals or plants in rock formations in Antarctica to bear out the theory that it was once a connecting link between Australia-New Zealand and South America. America's pouched animal, the opossum, akin to the sole mammal type of Australia, New Zealand and Tasmania, may have crossed on this land bridge, which would account for the complete absence of this type of animal in Europe, Asia and Africa. Again, South America has a parrot which is a close relative of the New Zealand kea.

The expedition plans to sail for the antarctic about next August—in a 17,000-ton ship not built for ice conditions and which will winter in New Zealand or Tasmania—prepared to remain a year and half. On its coast, somewhere on the shore of Ross sea, possibly at Discovery bay, where Amundsen had his base, but more likely on the Bay of Whales, it will establish a unique little city such as the world has never seen.

This tiny, but, for the time, important, municipality will have buildings of the latest temperature-resisting construction, lighted by electricity and heated by oil or coal. It will have telephones for intercommunication and be fully in touch with the rest of humanity by radio. For transport, airplanes are by no means the sole dependence; there will be American endless-tread trac-



Trapped and Crushed by South Polar Ice, Shackleton's "Endurance" as She Disappeared beneath the Grinding Floes, Leaving Twenty-Six Men Homeless on the Ice



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Sectional View of Commander Byrd's Plane "America," in Which He Flew from New York to the Coast of France Last Summer; Somewhat Similar Ships Will Be Used in the Pole Flight

tors with special snow treads to haul planes about and draw trains of sledges. The latest metal and woodworking machinery will be in its machine shops and its storehouses will be replete with extra parts. Gasoline engines are to furnish its power, similar to those which will drive the portable dynamos that generate the community's electric current.

Roughing it is, of course, the lot of adventurers at either pole, but these will have their lot made more tolerable by all science or human genius can do. A large assembly room in one of the main buildings will have a fine library of late and standard fiction and reference works, many games, a phonograph or two with hundreds of records, a portable organ and other musical instruments, a stereopticon with a wealth of slides, motion-picture projectors, and much besides.

The radio station will be a feature of the little city. Experts have built for it the latest model in sending sets using a short wavelength of forty meters, and are confident this will maintain communication with the United States. Another sending set on a much longer wavelength will easily reach out 1,500 to 2,000 miles. There will be several receiving sets.

Nothing that the expedition's leader or his aides can think of which would make for human safety or simple welfare will be overlooked, and by a year from now very interesting news should come out of the antarctic.

"LIQUID PEARLS" OF FISH SCALES BASIS FOR NEW INDUSTRY

Manufacture from fish scales of "pearl essence," a liquid used in coating artificial pearls, backs of combs, brushes and dressing-table sets, is a new industry on the Pacific coast. A plant for the preparation of the "liquid pearls" has just been established near San Diego, Calif., and the product sells for from $60 to $200 per pound, depending upon the quality. The scales are taken from sardines as the fish are delivered to the canneries. After being washed, they are put through special treatment with ether.

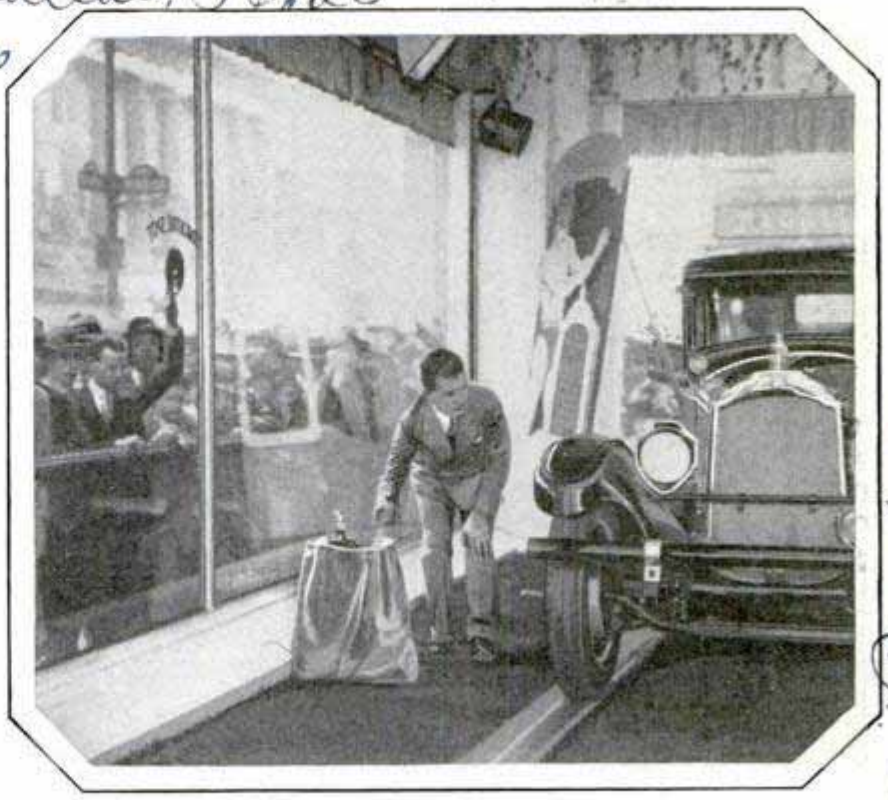
UMBRELLA FITS IN HANDBAG FOR SHOPPER'S COMFORT

Carrying an umbrella is usually a bother, but one that has a short stick and can be stowed away in a pocket in a special handbag eliminates most of the difficulty and leaves one hand free. The sheath about the umbrella protects the contents of the bag from dampness and the outfit also offers the advantage of helping safeguard against loss by accident or theft.

Slipping Umbrella into Convenient Handbag Pocket, Where It Is Easily Carried and Safer against Loss or Theft

HARD ROADS SAVE TIRES

Engineers of a southern bus company have found that gravel roads cost them two cents a mile more on tires than do hard-surfaced roads. They estimate that the saving of hard roads in the wear to the tires of an average car is at least six-tenths of a cent a mile. At a recent meeting of officials interested in municipal improvements, W. H. Rhodes, a New Orleans engineer, declared that a highway carrying 6,000 vehicles in twenty-four hours will, in five years, wear down gravel laid eight inches thick to a veneer of less than three inches. Sprinkling hastens this wear. The original cost of gravel roads is high and their upkeep expense is also great. In towns having at least 1,000 cars in motion daily, Mr. Rhodes estimates that there would be a saving of $2,190 a mile per year in tire wear alone, if the roads were hard.

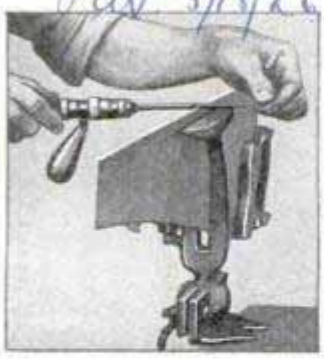


By Passing His Hand over the Opening in the Window, the Man Outside Is Able to Start Demonstration Auto through Action of Relays

WAVE OF HAND STARTS AUTO FOR WINDOW DISPLAY

Crowds of delighted spectators thronged in front of an automobile show window in New York recently and amused themselves by starting a car displayed inside, simply by passing their hands over a hole in a disk on the glass. The action caused sensitive electric controls to function, throw a switch and start the car, which rolled slowly forward on a track until it threw another switch and was reversed.

SAW FILE WITH WEIGHT HELPS GIVE TEETH SAME PITCH

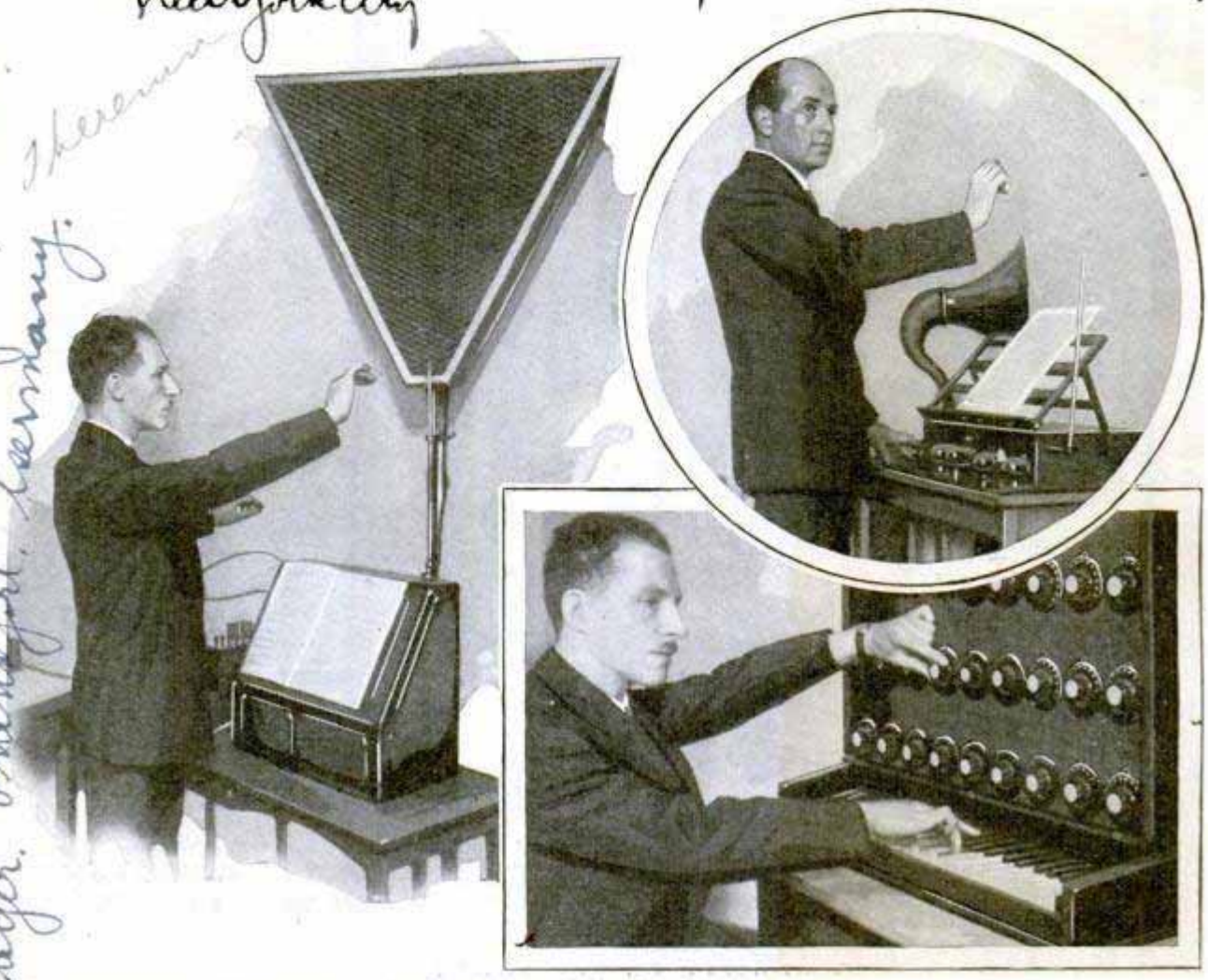


Saw teeth can be filed more easily to the same pitch by using a weighted file recently introduced. It is provided with a scale and marker to permit setting the file in its holder at the proper position to cut the teeth to the desired pitch, and the weight causes the file to move in relation to the handle until the weight reaches the lowest possible position, which will be the point at which the desired pitch is attained. In this way, every tooth on the saw can be easily filed to the same pitch. If desired, the weight may be removed and used as a plumb bob.

LIFE PRESERVER FITS IN POCKET AND INFLATES ITSELF

For sea or air travelers, a life preserver just introduced is especially serviceable, as it is carried in a small leather case that fits the pocket, and inflates itself as it strikes the water. This is accomplished by the automatic release of gas in a small rubber balloon. The preserver is said to remain inflated quite long.

MUSIC FROM THE AIR PRODUCED BY WAVE OF HAND



Instruments That Produce Music by Taming the Radio Squeals Due to Varying Body Capacity; the Right Hand, in the Picture at the Left, Produces the Tone and the Left Regulates Volume

Producing music out of the air by merely waving the hands in space has been demonstrated with more or less success by two radio engineers in Germany. The secret lies in "body capacity," the familiar phenomenon which many radio fans have encountered when their radio sets changed pitch or squealed when a hand approached the condenser to change the tuning. The two aerial musicians have simply tamed the squeals by developing a system in which the body capacity is controlled by moving the hands until each motion produces a corresponding musical note. The tones of a violin and a cello, and a close resemblance to the human voice were produced. All of the selections, as music critics pointed out, were chosen because they were slow and rather simple pieces, of a kind adapted to the difficulties of production. A metal rod forms the antenna near which the fingers "play" and a single-wire loop at the side permits changing volume by advancing or withdrawing the hand. A two-tube set and loud speaker complete the outfit.

SAWING GUIDE SIMPLIFIES TASK OF CUTTING AT ANGLES

Sawing at angles is usually a somewhat difficult task, especially for the amateur, but the work is greatly simplified with a guide that also serves as a miter, T-square, precision tool and protractor. It is simply a plate arrangement with a loop through which the saw is inserted after the

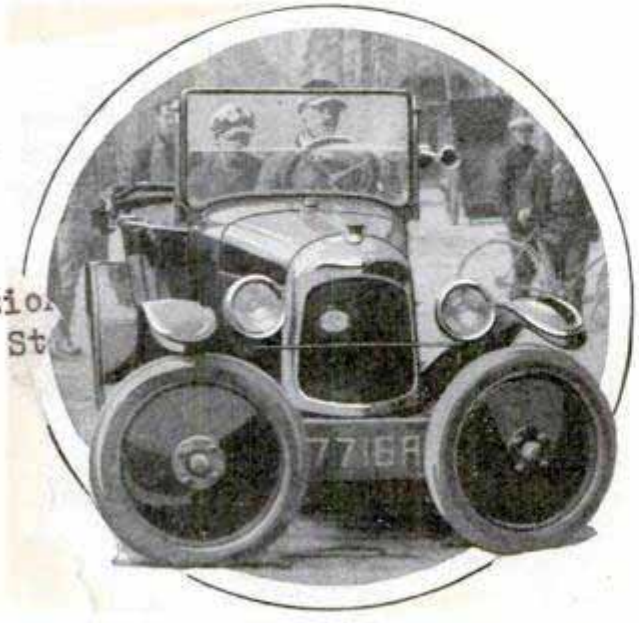
guiding member has been set to the proper angle. Accuracy is insured, there is practically no danger of the saw slipping and no need for pencil markings. The tool can be used for measuring the angle between walls that are not ninety degrees, for instance, and for other purposes. Little skill is required to operate it and it will serve on both indoor and outdoor jobs.

WINDOW DISPLAYS BY RADIO TO AID ADVERTISERS

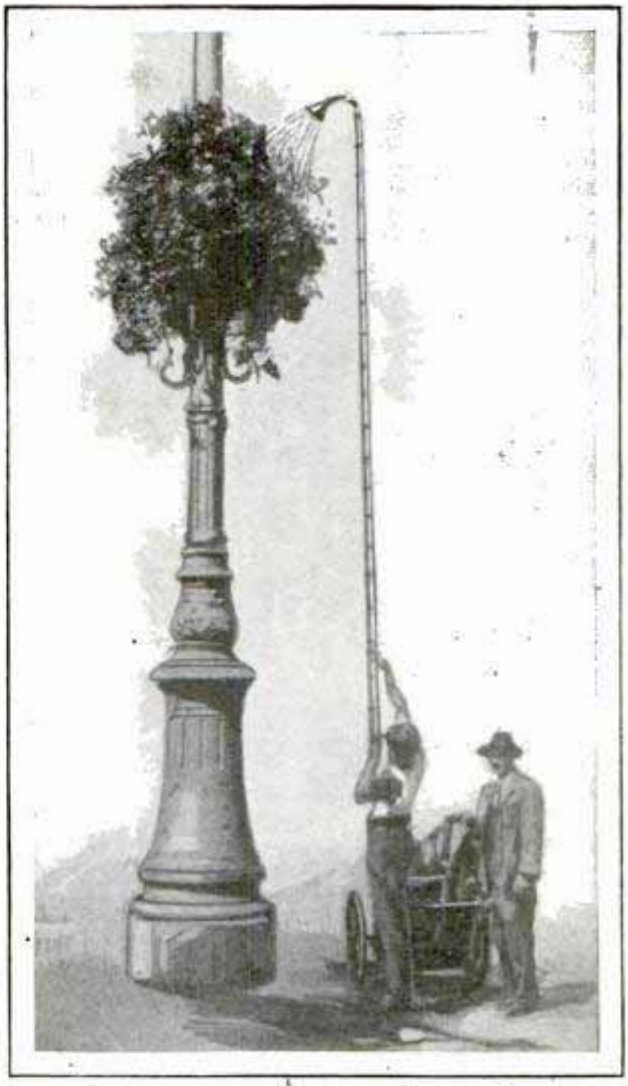
Transmission of billboard pictures and advertising window displays by radio from a central broadcasting station is foreseen as a result of a recent invention by C. Francis Jenkins. It is similar to the apparatus used for receiving weather maps sent by wireless, but instead of being registered on a disk, the pictures are recorded on a broad, flat surface, by a carrying arm that sweeps over it like a fountain pen. This arm is actuated by impulses broadcast from the central radio station.

AUTO TURNS IN OWN LENGTH TO ESCAPE TRAFFIC JAM

Especially suited to service in congested streets, an automobile introduced in Paris can be turned in the space of its own length. This is made possible by wheels that swing around at sharp angles so that the car can be whirled about without repeated backing up and turning.



...h Wheels That Turn at Sharp Angle Can Be Managed Easily Where Traffic Is Congested



Sparing the Attendant a Climb up a Ladder; Watering Street Pole Garden with Extension Sprinkler

EXTENSION POLE FOR WATERING AIDS STREET GARDENS

In Vienna, plant and flower boxes have been attached to the electric-light standards on some of the streets. As they are too high to be watered from the ground, an extension pole, carrying a length of hose, has been devised for sprinkling the little gardens in order to eliminate the necessity of a ladder and save the trouble of climbing.

WOOL IS MADE MOTH-PROOF BY CHEMICAL TREATMENT

German chemists are reported to have discovered a way for making wool distasteful to moths. The process is said not to injure in any degree the material, which retains the same appearance and has the same feeling after the treatment but repels the moths.

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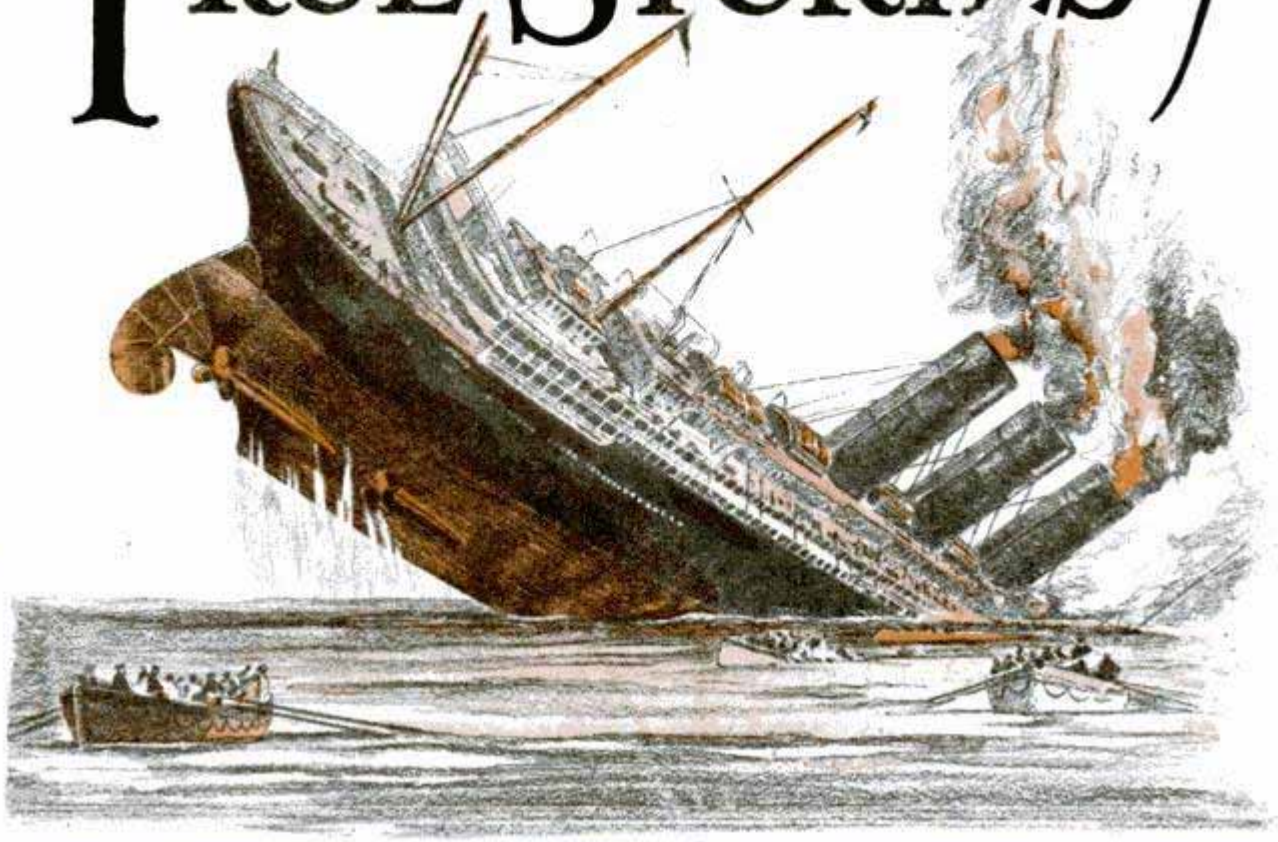
TRUE STORIES of



One of the Greatest Sea Tragedies of All Time, the Sinking of the "Lusitania" by a Submarine off the Irish Coast, in 1915, as Drawn from the Survivors' Stories

By HAROLD T. WILKINS

"Colomberie"
Barnehurst Road, Bexley Heath, nr. London, Eng.

SOME time ago, a fast steamship, fitted with radio apparatus and embodying the latest devices known in the science of marine engineering, set sail from Montevideo to Rio de Janeiro. She was loaded with Argentine wheat for Antwerp.

From Montevideo to Rio is a distance of 1,100 miles over a sea lane right in the track of ocean-going liners and freight vessels. She was to touch at Rio, take in cargo, and then sail direct to Antwerp. Days passed and she did not arrive at Rio. No radio SOS had been sent out and no passing vessel had observed her. She vanished as completely as mists before the rising sun, and, from that day to this, no clue has ever thrown the least light on the mystery.

Modern radio and the latest airplanes in the service of ocean sleuths are powerless when faced by these baffling mysteries, which occur more often than landsmen imagine. The wires hummed with this mystery of the "Tenzam Maru," overdue in the South Atlantic, and 6,300 miles away the news of the missing, radio-equipped steamer came to the royal exchange, the home in London of the famous sea corporation of Lloyd's.

The ship's owners, in despair at the absence of any news, applied to Lloyd's to have her posted as missing. A printed notice was affixed to the baize board of the "Chamber of Horrors"—Lloyd's agony room or ships' graveyard—asking news of the lost ship. A week later, no word having arrived, a "caller," wearing a picturesque scarlet robe with a fur collar, rang one short stroke on the "Lutine" bell. If the missing ship had reached port safely after the report of missing—a very rare occurrence—he would have rung two short strokes. He next mounted a rostrum and announced that the ship, which sailed from Montevideo, on such a date, for Antwerp had not been heard of since. The ship was then posted as missing, and a notice stuck on a special board. Next

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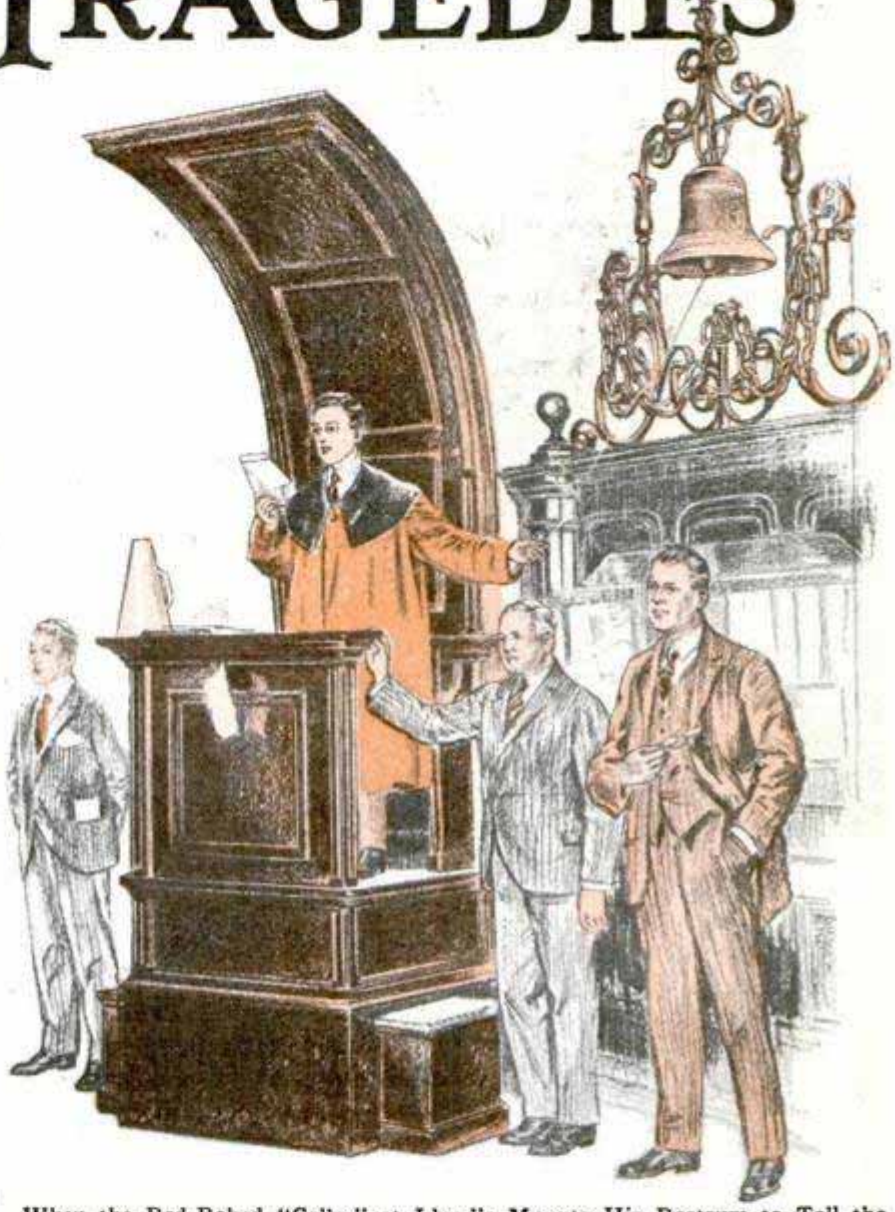
SEA TRAGEDIES

day the loss is payable by the underwriters, while relatives of the missing seamen (presumed dead in law) may obtain probate of their wills, if they have any. This is the proceeding in the case of important missing ships.

Lloyd's keep a big book of missing ships, bound in green leather, in which there are recorded details of the events. The "Lutine" bell, hanging in chains over the caller's rostrum, has a romantic association with a mystery of a treasure wreck of the days of Napoleon Bonaparte.

The ship "Lutine" was a captured French frigate which left Yarmouth, Eng., on Oct. 16, 1799, bound for Cuxhaven, Germany, with about $10,000,000 of specie to pay the debts of London merchants. Two days later a fishing smack, passing close to the "Lutine," was amazed to see this ship ablaze with lights, and a scene of riot and revelry in her main cabin.



When the Red-Robed "Caller" at Lloyd's Mounts His Rostrum to Toll the "Lutine" Bell Another Ship Has Disappeared from the Seas

At midnight, running under a press of canvas, the "Lutine" struck a shoal off the mouth of the Zuyder Zee, Holland, and sank at once, only two sailors, clinging to spars, being picked up by a Dutch boat. The castaways died a few hours later, and were never able to tell what brought the "Lutine" so far out of her proper course. The Dutch government claimed the wreck, refused to allow British salvors to fish for her treasure, and for fifty years Lloyd's battled in the law courts with the Dutch authorities over this claim. Only $500,000 worth of gold has been raised from the wreck, and today, on the shoals of Vlieland, there are about $8,000,000 of specie waiting for some lucky salvor of the future.

The "Lutine's" ship bell was fished up from the shoals and hung in chains at Lloyd's, London, whose president today sits in a handsomely carved chair made out of the ship's rudder. So many years passed before even the relatively small amount of bullion was raised from the wreck that the original underwriters, who settled the claim for $5,000,000 the day after the news of the loss reached London, were long dead, and could not be traced, owing to the destruction by fire of Lloyd's records in the royal exchange. So the money was used to set up Lloyd's signal

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stations on coasts and cliffs all round the world.

Close to the caller's rostrum is the famous graveyard or "Chamber of Horrors" —Lloyd's agony room. No skeletons or grinning skulls decorate this chamber, and there isn't even a replica of Davy Jones' locker. In the graveyard is a casualty board to which are pinned each day radio messages and telegrams telling of ships' accidents, arrivals and sailings. Daily, a clerk writes in large script the more serious casualties, which he enters in a big book, close to the notice board, and they are next day recorded in Lloyd's Shipping Gazette.

Queer yarns and strange mysteries of derelicts, wrecks and missing ships are buried in the immense store of volumes accumulated in the library of Lloyd's since 1838. There is an old-fashioned captains' room at Lloyd's—today a tea room for members—where the old windjammer skipper and the dapper captain of the old-time Indian tea clipper told startling yarns of adventures with pirates, or boarding ghost-ridden derelicts on dark nights. In this room, the last captured slave ship and the first large ocean steamship were sold by auctioneers who stuck a pin in a candle and stopped bids when the flame burned down to the pin.

Derelicts met at sea, and reported to Lloyd's agent at the nearest port, provide weird thrills and baffling mysteries. A Nova Scotian captain of a barque, bound from New York to Gibraltar, sighted a brig and signaled. He received no reply, and something queer about the sailing of the ship struck him. He looked through his glasses, but could see nobody on her deck.

"She's a derelict," he said to the mate. "Lower a boat." As the crew pulled up to her, they saw painted on her stern in white the name "Mary Celeste." A strange sight met their eyes in the cabin. A table was laid for breakfast which had been half eaten, and it seemed as though the occupants had left in haste. "Mary Celeste's" boat hung untouched on the davits. The captain looked in the log and saw that the last day recorded on the "Mary Celeste" was eleven days before. Bewildered, the Nova Scotian captain towed the mystery ship to Gibraltar to claim salvage. There, the officials of the British vice-admiralty court searched her, but found no signs of fire, bad weather, or explosions. A sword was picked up showing traces of blood having been wiped off before the blade was returned to the scabbard. A puzzling feature was that both bows of the "Mary Celeste" had been recently cut by a sharp instrument. The court made a second examination and discovered marks of an ax on the top-gallant rail and signs of blood. The manifest, the bill of lading, and the sextant were all missing.

Now, the "Mary Celeste" was a 500-ton brig, commanded by Capt. Griggs, who had his wife and child aboard on her last fateful voyage. She was bound from New York to Genoa. The archives of the state department at Washington say that both sword and rail found on the "Mary Celeste" were free from blood. But leaving aside this apparent conflict of official evidence, what are we to make of the curious slashing of her bows with a knife? Was it faked evidence of a collision? The mystery remains unsolved to this day.

A grim event occurred at sea in the fall of 1926, which parallels some of the details of the mystery of the "Mary Celeste" and may throw some light on the fate of her crew. The Norwegian walrus-fishing steamship "Istiennan" was found abandoned off the lonely coast of Finnmark, in the region of Norway's "land of the midnight sun." There was no one on board, the table was laid and the lamps were still burning. No theory of the mystery was formed and the enigma remained unsolved until November, 1926, when a German sailor made a confession on his deathbed in the hospital at Hammerfest, Norway. He said that, in company with liquor smugglers, he had boarded the Norwegian steamship. They overwhelmed her crew by a sudden attack, murdered them, and threw the nine bodies overboard. Then the pirates looted the ship, prepared a table for dinner, lit the lamps as a "blind" and escaped in her lifeboat ashore, and last, on reaching the wild and lonely coast, burnt the boat to cover up all traces of their crime.

Pirates are not unknown in European waters even today. In April, 1925, three men rowed out to a British trawler repairing her nets and gear at Trondhjem, Nor-

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way and, overpowering the engineer who was the only person aboard, stole all the valuables they could find. The British steamer "Branksome Hall" reported to Lloyd's the finding of a derelict four-masted barque, the "Buteshire," in mid-Atlantic. The ship, which was on a voyage from Pisagua, Chile, to the English channel, was flying signals of distress, but when the "Branksome Hall" bore down on her, she found her in good order, though abandoned. The lifeboats were gone and the lights were still burning.

Cut in Two above the Water and Dynamited Apart below, the Halves of This Stranded Liner Were Saved

© Topical Press Agency

Underwriters Consulting the Lost-Ship Book at Lloyd's

The Atlantic, of all the seven seas, presents the most baffling of marine mysteries. The British trading ship "Marathon" met a 1,000-ton vessel with disordered rigging. No reply came to the "Marathon's" hails. The captain saw she was undamaged and deserted and sent a crew to board her She was the "James B. Chester," an American ship. Her paintwork was fresh and brasswork polished, but the boarders were so scared by her appearance and strangeness that they kept close together and tiptoed over the decks.

No sound was heard but the creaking of wooden blocks, the groaning of the rudder, and the lapping of the water against her sides. Amidships the cabins were in disorder, furniture was overturned, a chest burst open, and clothes strewn about. Her cargo of wool and provisions was intact, and there were no signs of violence, but the ship's compasses and papers were missing. The "Marathon" towed the mystery ship to Liverpool. Why did the crew quit her in a sudden panic, taking a few valuables in their flight? The answer will never be known.

Another English ship sighted an American-built sailing vessel in the south At-

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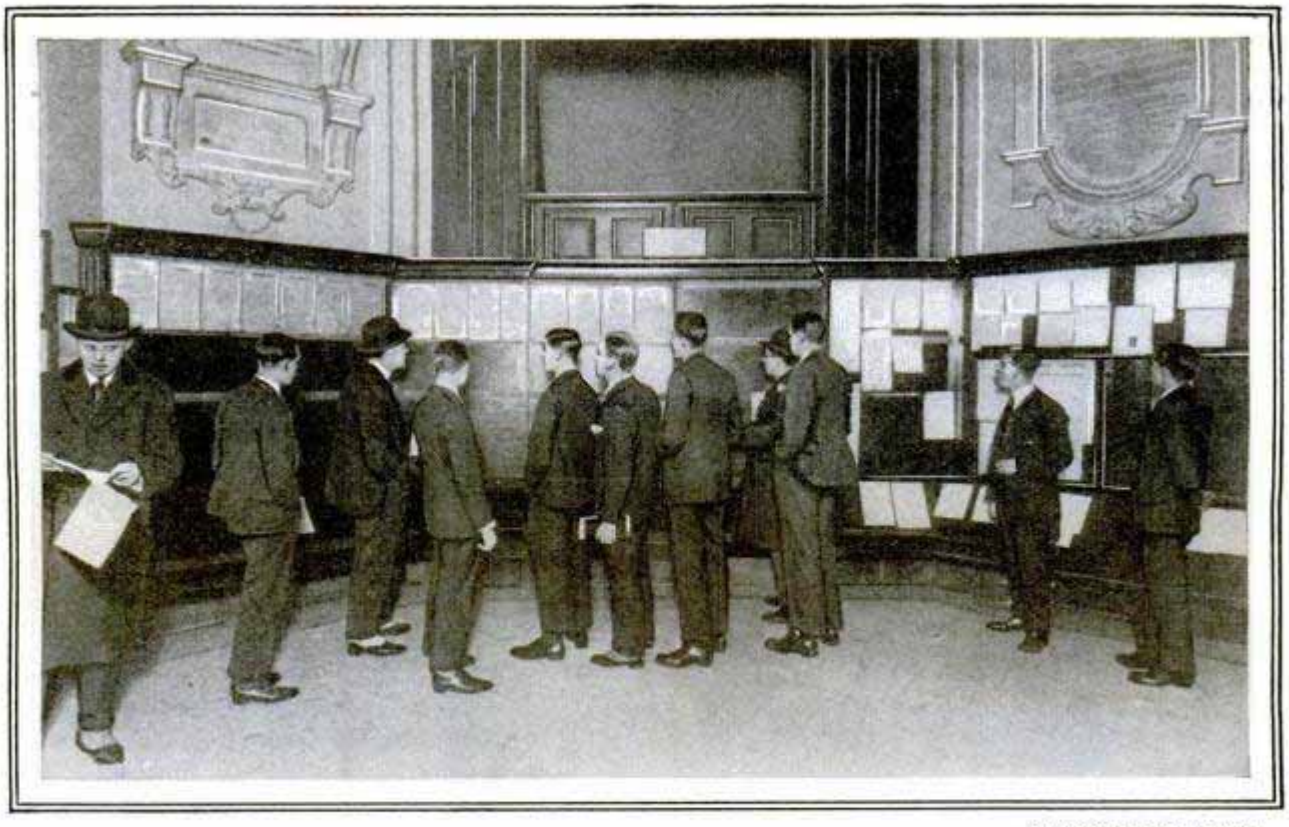
lantic. The American ship had badly battered bulwarks, and no one aboard. The name "Orion" was read on her bows. A boarding party landed on her decks, but the sailors presently returned, violently sick, to the English ship. They said they saw a man lying on his back at the foot of the steps down a companion way. On going to see what was the matter, an abominable smell belched up to them, and they had to retreat. The English captain went on his way, and the "Orion" was never seen again.

There also are tales of haunted ships. One such was the "Squando," a trading vessel anchored off the wharves of Bathurst docks, N. B., Can. No crew would man her, and the tale was that when the "Squando" was lying off San Francisco at anchor, the captain and his wife suddenly attacked the mate. The ship became haunted after that, in the opinion of mariners. The Norwegian consul at Bathurst engaged two watchmen to look after her, but after the first night, they came off and declined to go back. Cold hands, said they, had touched them in the night, caught their clothes, thrown articles about the deck, while ghostly voices of unseen beings kept telling them to quit at once. In the cabin they had seen the shadowy outline of a man in seafaring costume minus his head. But, whatever the reason, the boat had to be abandoned, for nobody would ship in her.

The tale of the mirage ship—the British gun brig "Baracoutta"—should be told by a tattooed seafarer, round a roaring fire of a winter's night. The "Baracoutta" was a ship in a squadron sent to explore the coasts of Madagascar and East Africa. She got separated from the rest. Capt. Owen, of the British warship "Severn," tells the story: "Off Point Danger, South Africa, one evening in April, the 'Baracoutta' was seen two miles to leeward. We at first concluded that it could not be she, but the peculiarity of her rigging convinced us we were not mistaken. Many well-known faces could be seen looking toward our ship. To our surprise, she made no effort to join us, but stood away. We were near the port to which we were both bound, and I attached no importance to the event. We continued our course.

"At sunset, she hove to and sent a boat, apparently to pick up a man overboard. During the night, we saw no light showing her location. Next morning we anchored and wasted a whole month waiting



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Lloyd's "Chamber of Horrors," Where the Radio and Cable Reports of Accidents and Losses at Sea Are Posted Each Day for the Underwriters to Inspect

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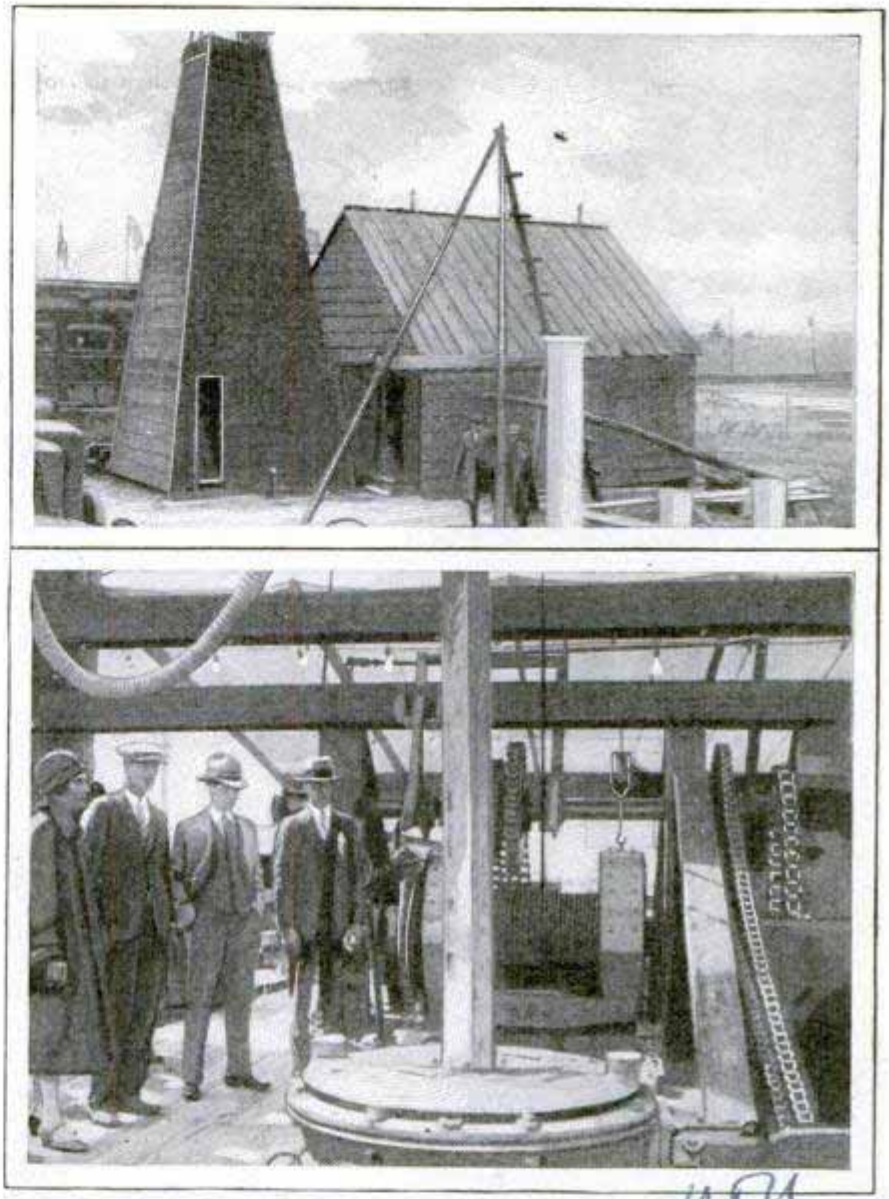
her coming. Afterward it appeared that, at this period, she was about 300 miles from us, and no other vessel of the same class was ever seen about the Cape of Good Hope." Was this a case of a marine mirage or refraction phenomenon?

Lighthouses have given rise to many of the unsolved mysteries of the sea. Out in the Atlantic, nineteen miles from the island of Lewis, in the outer Hebrides of western Scotland, stands a lonely lighthouse, called the "Seven Hunters." The light stands on cliffs of gneiss, 150 feet above the sea. Of its staff of keepers, one man is always on leave. Not long ago, the relief ship was twenty days overdue, owing to fierce December storms, and as it approached the island, it signaled the lighthouse, but got no answer. So the relief man landed with letters and provisions. He stepped onto a landing stage cut out of live rock. A crane and rope derrick hung over the top. No preparations had been made to meet the relief ship, and the wondering lightkeeper ran up the stairway to the entrance of the lighthouse. Nobody answered his hails, and when he went inside, he found the place empty, the clock stopped, and no fire lit, although the day was cold. There was no trace of the missing men. Then, some time later, a queer thing happened. It was noticed that, in calm weather, the sea would suddenly upheave and rise to a great height above the rock base of the lighthouse to the landing stage. If men were standing on the platform, they would be sucked back by the retreating waters down into the sea beyond the possibility of rescue. This was probably the fate of the missing lightkeepers.



Oil-Well Drilling Development at a Glance; Upper Photo Shows Old-Fashioned Hand-and-Foot Rig; Lower, a Modern Outfit

GROWTH IN OIL-WELL DRILLING SHOWN IN CHANGING RIGS

Combined hand and foot power was used in drilling some of the first oil wells in America, as an exhibition of old equipment at a recent gathering in Tulsa, Okla., showed. In contrast to this old-fashioned outfit was shown one of the latest rotary drilling rigs, operated by powerful machinery and capable of penetrating, with comparative ease, hard strata of rock and other materials.

¶Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished, free, to anyone addressing our Bureau of Information.

at Long Beach, Calif.

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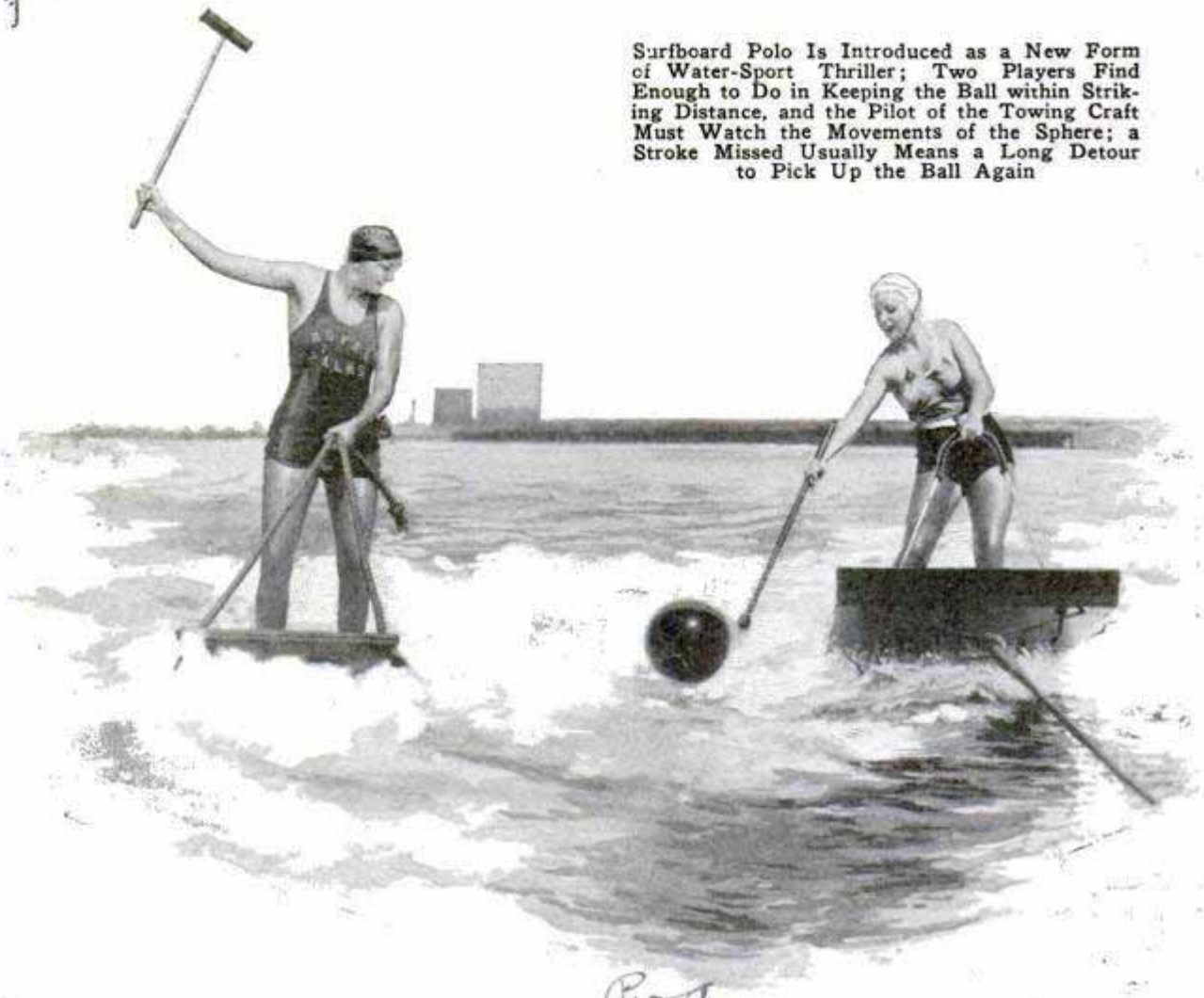


Surfboard Polo Is Introduced as a New Form of Water-Sport Thriller; Two Players Find Enough to Do in Keeping the Ball within Striking Distance, and the Pilot of the Towing Craft Must Watch the Movements of the Sphere; a Stroke Missed Usually Means a Long Detour to Pick Up the Ball Again

P-TA

POLO PLAYED ON SURFBOARDS TESTS RIDERS' SKILL

Additional thrills are furnished from surfboard riding in a form of polo game played with a large inflated ball and long clubs. As the boards are towed along, the riders endeavor to keep the ball in motion with the clubs and strike it back and forth. The task calls for unusual skill in balancing as the strikes are made.

STEAM BOILER TO CLEAN PIPE LATEST SMOKERS' AID

2435

For a quick and thorough cleansing of the tobacco pipe, a metal boiler with a nozzle that fits into the stem, has been devised. The bowl of the boiler is partly filled with water, a cap screwed on and the nozzle introduced into the pipe stem. The boiler is held over a gas jet or other flame until the water boils, forcing steam through the pipe. Considerable pressure is developed, sufficient to blow out all accumulations of sediment. There is practically no risk in handling the cleaner as the bowl is made of metal, consequently eliminating the danger of breakage.

AUTOMATIC GUN REPLACES BELL AS BURGLAR ALARM

3932

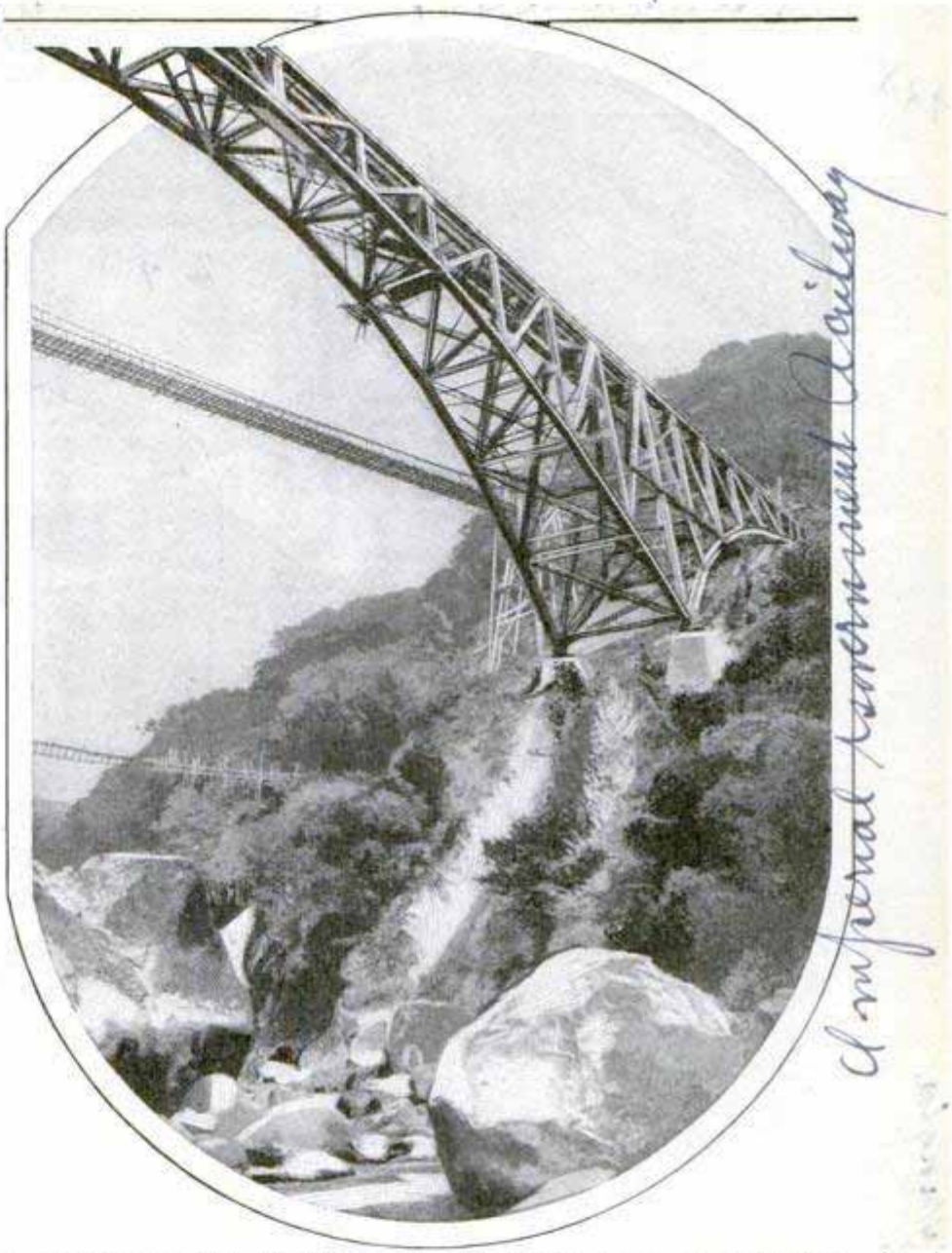
Bank bandits ordering the cashier to "stick 'em up," are bound to meet a surprise in a machine-gun alarm recently devised as a substitute for the ordinary bell or buzzer signals. It is fired from the cashier's cage by electrical contact through pressing a button down and sideways. This is done by the person behind the bars and can be accomplished without attracting the attention of the bandits, while the side motion necessary makes it unlikely that the signal will be fired by mistake. The gun is intended to be placed over the entrance, or in a similar location, so that the marauders will have to turn around.

It shoots only blanks and is aimed through a metal tube outdoors, the object being mainly to frighten the intruders and distract them momentarily. Two shots are first fired in rapid succession, then, after a pause, four more come at short intervals. The reports are heard loudly in the bank as well as on the outside and serve as a compelling alarm both to drive the bandits out and to summon assistance for the persons in the bank. Tests have been made to insure that the installation cannot easily be thrown out of order or the gun fired accidentally by vibrations or rough handling.

TALKING-MACHINE RECORDS WILL NOT BREAK

Phonograph records that are said to be practically indestructible have been introduced recently. Dropping or striking them does little damage, and the playing surface is not easily scratched, according to reports. They are sewed into special containers for mailing and can be shipped with little likelihood of breakage.

Sewing the Unbreakable Records into Their Containers for Mailing; Little Extra Wrapping Is Needed



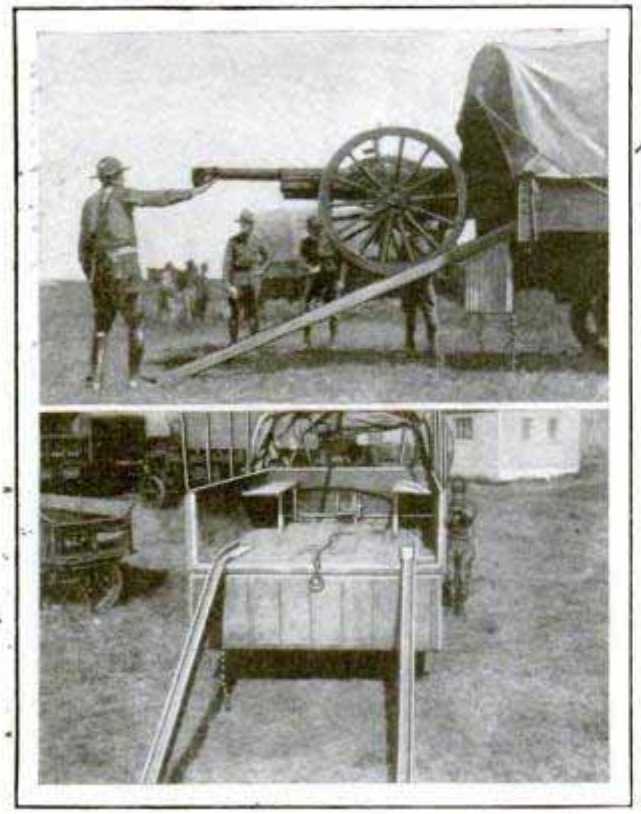
One End of the Lofty Steel Bridge Recently Built in Japan; It Is 450 Feet Long and Spans a Gorge 500 Feet Deep

WINGS OF GIANT BRIDGE MEET FIVE HUNDRED FEET IN AIR

Spanning a gorge 500 feet deep, a steel railroad bridge recently built in Japan called for the greatest accuracy in figuring and construction. It was started from each side of the canyon and met in the center. So exactly had the bridge been planned, that the last units fitted perfectly. Engineers reported that a piece of paper could not have been inserted between the final steel members. The bridge span has a length of 450 feet.

¶The potato is said to have originally come from South America.

WINCH TO LOAD GUNS SAVES SOLDIERS' TIME AND WORK



Gun on the Ramp and View inside Auto Truck, Showing the Arrangement of the Loading Winch

One man can load an artillery piece weighing 2,700 pounds on an army motor truck in about a minute and unload it in a few seconds with a special winch recently developed. The guns are rolled up on two beam ramps with a cable which winds about a drum as the crank of the winch is turned.

PICTURE RECORD OF U. S. WARS TO AID HISTORIANS

A collection of photographs, showing scenes from all the wars in which the United States has been engaged since 1860, has been placed on file in the war college. It comprises between 275,000 and 300,000 prints and includes important records of the Civil, Indian, Spanish-American and World wars. One of the most interesting of the entire collection is of the battlefield of Wounded Knee, scene of Custer's last stand, taken immediately after the battle. The Brady collection of the Civil-war period, numbering about 6,000 photographs, is also filed. The World-war section includes all pictures made by the signal corps, the army, the only British collection of World-war pictures in this country and an Austrian section. Negotiations have been completed with the German government for approximately 1,200 pictures.

RADIO RECORDS EARTHQUAKES WITH GREATER ACCURACY

Earth tremors can now be studied with a degree of refinement hitherto impossible with an electric apparatus developed in Japan. It makes use of the ordinary radio vacuum tube and consists chiefly of a pendulum, held about ten degrees out of vertical by a prop against a thin metal diaphragm which serves as one element of an electrical condenser. The second element is placed so that any variation of the pressure of the prop will vary the distance between the elements and so vary the capacity of the condenser. This variation is registered by means of a galvanometer, enabling a reading of the earth movement.

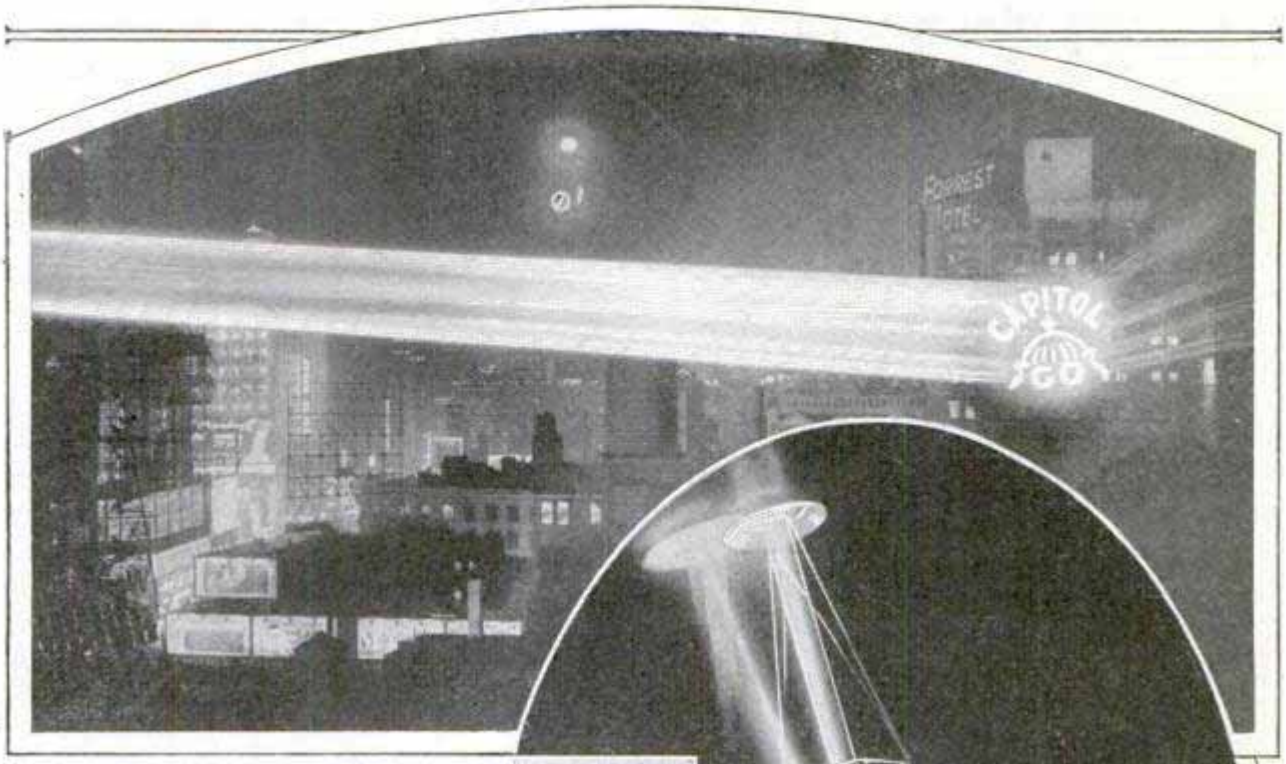
GOLF-BALL HOLDER FITS IN BAG TO SAVE ROOM AND TROUBLE

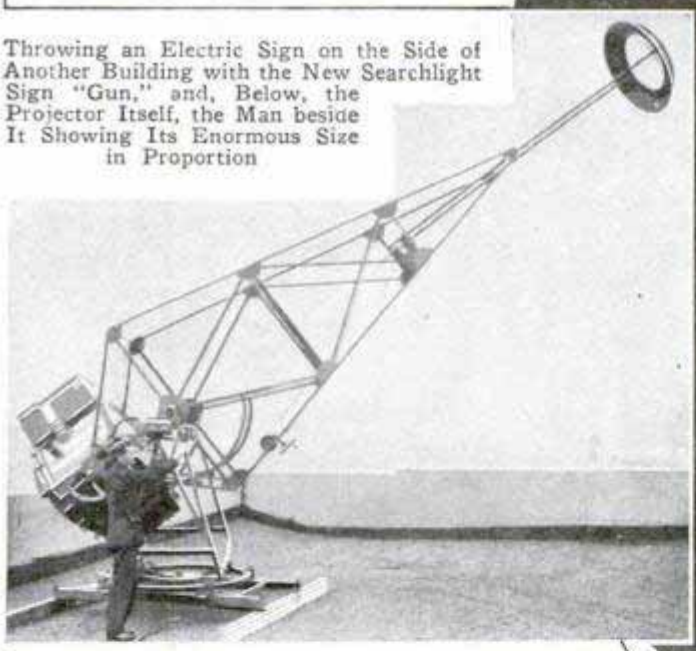
Bother of loose golf balls with the likelihood of loss and theft is avoided in a holder that slips into the bag, keeps a dozen balls in plain sight for quick selection and also has a nickelplated container at the top for tees or cigarets. The spheres are securely held in spring-steel wire clips and the "rack" is well suited for practice, when the player does not want to carry a bag.

Golf-Ball Rack Filled and Ready to Be Slipped into the Bag; It Helps Prevent Loss

366 Advertising Capitol Theatre

GIANT LIGHT USES SKYSCRAPERS AS BILLBOARDS





Throwing an Electric Sign on the Side of Another Building with the New Searchlight Sign "Gun," and, Below, the Projector Itself, the Man beside It Showing Its Enormous Size in Proportion

A sky-writing sign of four billion candlepower, the invention of Grindell Matthews, the English scientist whose "death ray" claims startled the world several years ago, was tried out recently in New York and sprayed signs in letters 150 feet high over the walls of the uptown skyscrapers. Mounted atop a movie theater to advertise its eighth anniversary, the big sign found all the neighboring buildings for a mile around too small to hold many of its giant letters, so it had to be shifted back and forth to paint successive words on the building sides. The framework of the sky-writing gun, which was designed to project advertising onto clouds, resembled a big reflecting telescope.

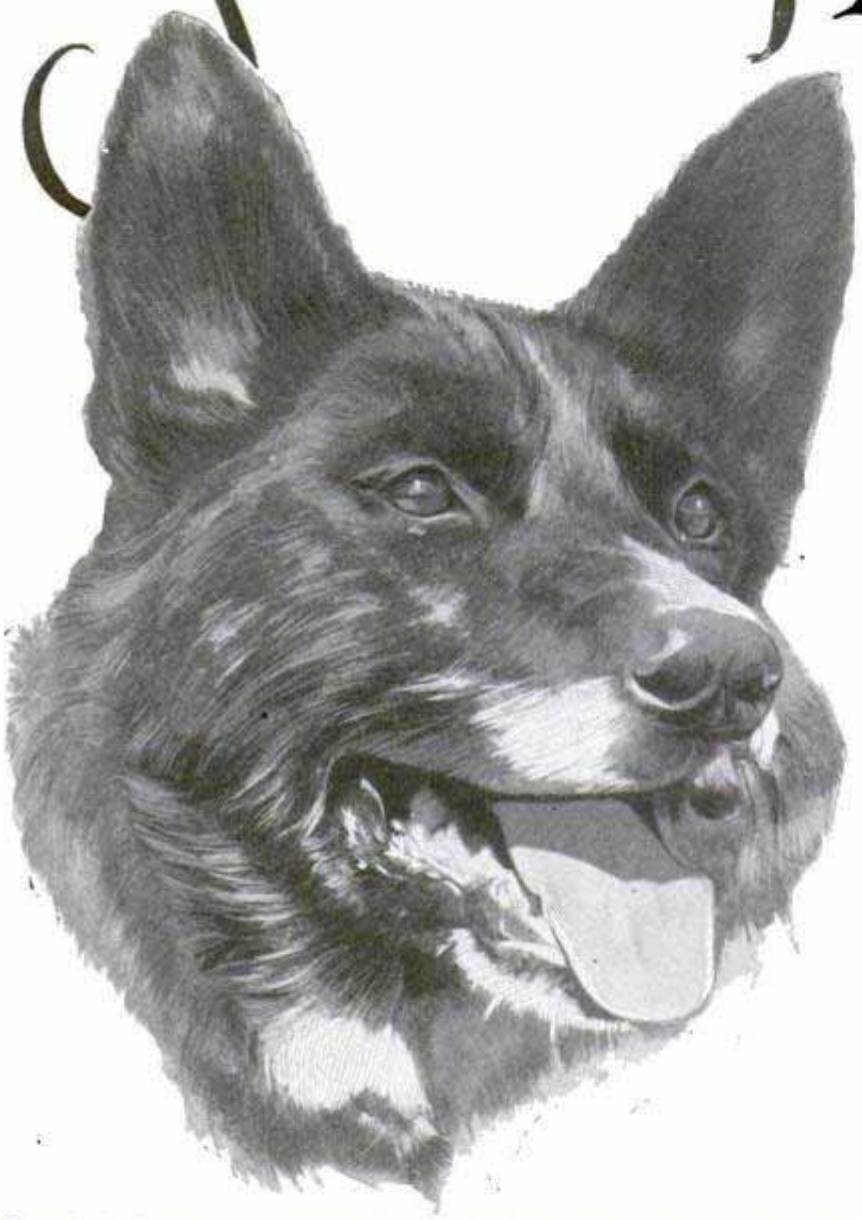
STAINLESS SHOES IN COLORS 3680

Shoes in a wide variety of colors that will not stain were introduced recently in London. According to reports, soot and other marks were easily wiped off with a damp cloth.

with Sperry Gyroscope Company, Manhattan Bridge

Chicago Daily News 1/8/27

Thrilling Dog



"Mountie," One of the Famous Leaders in the Great Quebec International Dog Derby, an Annual Event

By EARLE W. GAGE

"MUSH—you! Mush on, Malamutes!" pleads the driver of the leading team as the racers approach the finish line. The snap of his long leather whip sounds like a rifle shot on the frosty air. Running beside his team of faithful dogs, he urges and commands them to give every ounce they possess to the race. In the next two minutes he will fight it out with a world-champion dog driver, and the next hundred feet decide the winner of the classic 200-mile race. As his lead dog breaks the tape the fractional part of a second ahead of the other team, a mighty roar is heard as 2,000 thrilled spectators give vent to pent-up emotions.

For the greatest races of the year are not run in million-dollar stadiums close to civilization, but in the heart of the northland, over wild and trackless snow trails.

The finish of this stirring spectacle is worth going many miles to see. Over the crest of a hill comes the first of the teams, the driver at the head of his dogs, no longer the gay and even-tempered fellow he was thirty hours ago when he crossed the starting line, but a tired and fretted man. Less than a minute behind runs the second driver, laboring with his last reserve beside his dogs, in an endeavor to cross the finish line first. Twenty-five seconds behind rides a fifty-year-old Alaskan musher, pushing with one foot behind the freshest-looking team on the course, little Siberian dogs traveling better than ten miles an hour.

These famous dog derbies of the northland are more than a race. They are a real test for real dogs. The light, fleet-footed team cannot win it in a canter. The men who draw up the articles of the race design them to encourage the development of the type of dog that has meant so

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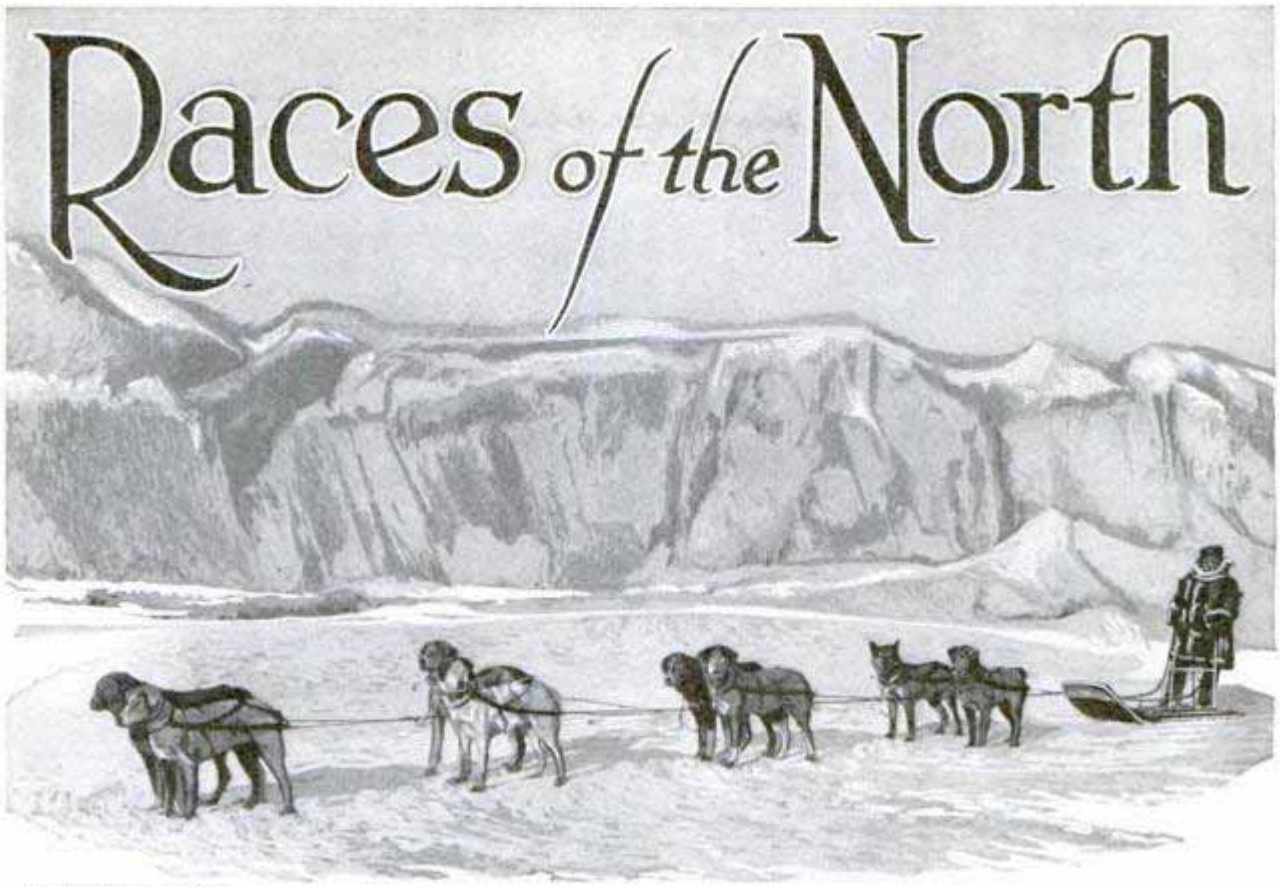
Races of the North



Courtesy Lomen Bros.

Scotty Allen, One of the Greatest Dog Racers of All Time, with His Team Coupled in Tandem on the Alaskan Sweepstakes Race Course, Dogdom's Kentucky Derby

much to the pioneers of the north and, so, stamina, courage, speed, strength and ability are qualities that must be possessed by the team which hopes to go the distance in the shortest time.

The first dog derby of international importance occurred at Nome, Alaska, twenty years ago, when "Lawyer" Albert Fink, a shrewd dog lover, raised $10,000 to be awarded winners. The distance was 408 miles, from Nome to Candle Creek and back, and every citizen for miles around was at the finish line to cheer the winners. The derby was won by John Hegness, driving Fink's team, in 119 hours, fifteen minutes, and proved such a popular success that the All-Alaskan sweepstakes became a regular feature until 1916, when the Hudson Bay dog derby, over a 200-mile snowy trail, from Flin-Flon, mushroom mining town, to The Pas, Manitoba, came into the limelight.

Although Scotty Allen, known as the "Dean of Dogdom," is the only man who ran in more than four All-Alaskan sweepstakes, it was "Iron Man" John Johnson who made the fastest record in the history of these epic races, turning the 408 miles in seventy-four hours, fourteen minutes. Walter Goyne holds the palm for the 100-mile The Pas race, with thirteen hours, fourteen minutes, and "Shorty" Russek the best time in the 200-mile race, twenty-three hours, fifty-two minutes.

Half a dozen famous races are run during the winter in snowland. At Prince Albert, Sask., where civilization is still close to the skirts of the unknown and unexplored northland, the dog holds the place of honor that the thoroughbred horse holds in cities where the woodland is considered a playground. The huge track is so arranged that spectators can follow the progress of the dogs for almost every foot of the 160-mile race, which is run in four heats of forty miles each, there being two laps to each heat on the twenty-mile oval track, the largest in the world designed for dog derbies.

At Ashton, Idaho, and Wolfeboro, N. H., are held two of the principal races run each winter in the United States. The winner at the latter classic last February was Leonard Seppala, hero of the Nome serum epic, who made the run of 113½ miles in eleven hours, fifty-seven minutes, forty-five seconds.

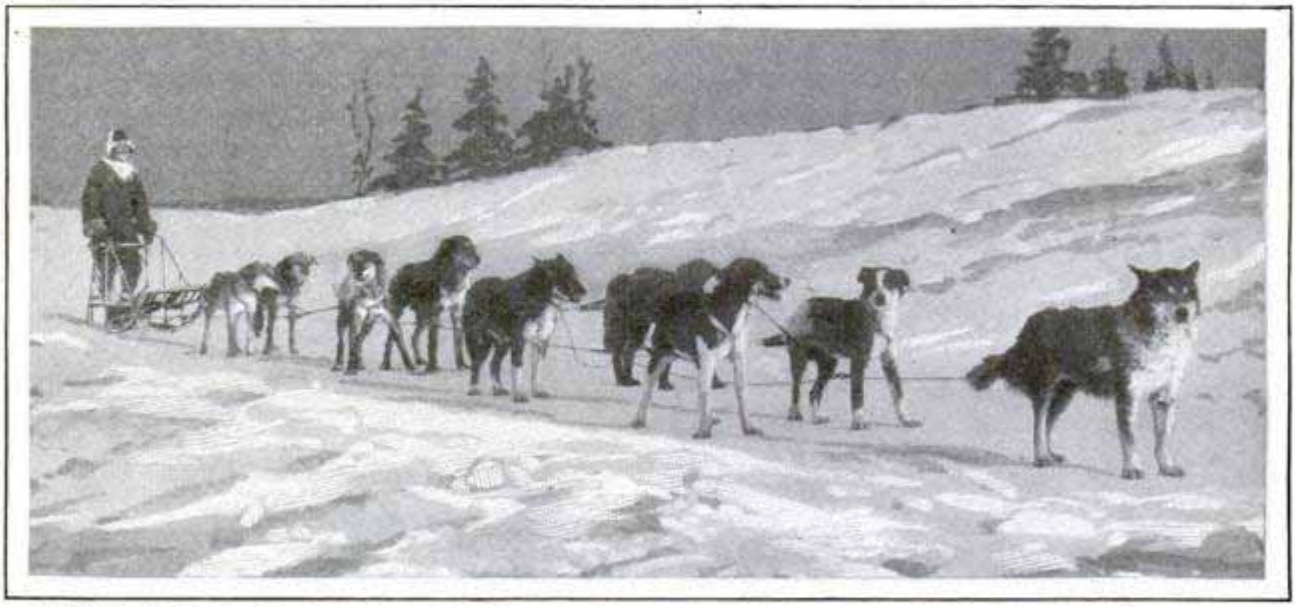
The third week in February the Inter-

Scotty Allen, the Dean of Northern Dogmen and Hero of Many of the Famous Snow Derbies of Alaska

national dog derby is held at historic Quebec city, and this 120-mile race was won last year by Emile St. Goddard, youthful driver of The Pas, who came in first in every lap of the three days' race. His time for the race was eleven hours, thirty-seven minutes, thirty-five seconds. He flashed down the Grande Allee to the finish line through more than a mile of cheering dog fans, beating all previous records in the race by fifty-four minutes, thirty-five seconds. Not only this, but he had the satisfaction of defeating Seppala by twenty minutes, twenty seconds, and passing a dozen other opponents in the race.

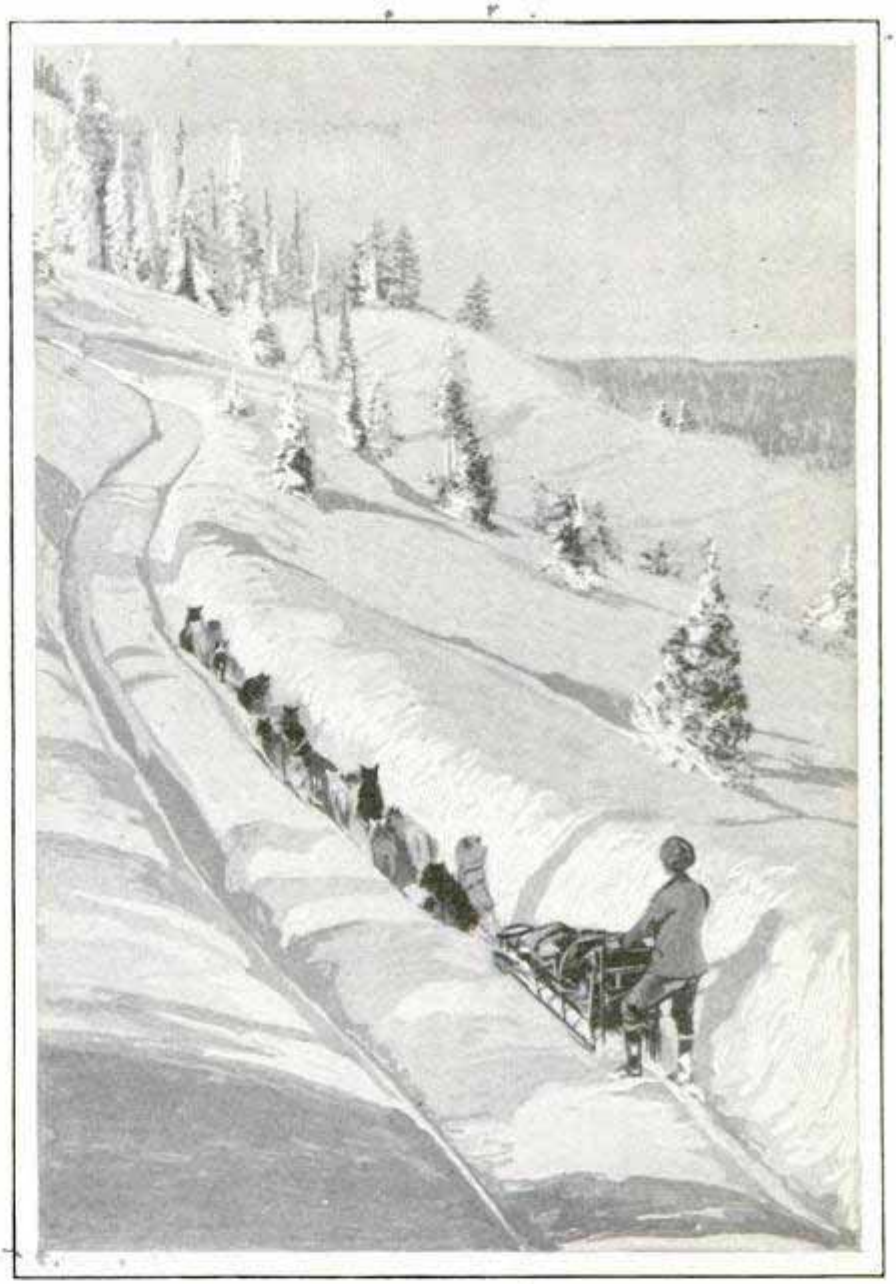
These dog derbies are run for prizes of from $1,000 to $2,500, besides coveted silver cups. In reality the drivers compete for the reputation of owning a string of dogs superior to those of any other section. There are from a dozen to a score of entrants covering the entire snowy course, the drivers being famous mushers of the north, powerful men of rare endurance and with the blindest faith in their teams.

Though much depends upon the teamster in the race, who will mush the 200, 160 or 120 miles behind the sleigh, the determining factor in achievement is the quality and power of the dog team. The husky dog is a hardy, sagacious animal of wonderful endurance, inured through generations to the climate of the north and the ardors of the snowy trail. He is a tremendous worker, all-enduring, and some-



Emile St. Goddard, the Frenchman Who Set the Record Time of Eleven Hours, Twenty-Seven Minutes and Fifteen and a Half Seconds for the 120-Mile Classic at The Pas, Man.

times partly of timber-wolf blood. In the matter of pedigree he usually is "too many kinds of dog" to stand much investigation of his family tree. His veins may carry the blood of the mastiff, German police dog, Great Dane, wolfhound, setter, spaniel or collie, or even a little of them all, while wolf blood imparts hardiness and a dash of speed. Although there have been varied methods of harnessing the dogs to the sleigh, Walter Goyne and Scotty Allen revolutionized dog racing with the introduction of the "gang" hitch, now considered standard for racing, which is a kitelike affair: One long trace from the nose of the sled to the leader, who is hitched alone, the other dogs being hitched in pairs to right and left of the central trace. This hitch insures versatility and least cross motion, which hampers smoothness and speed. Anywhere from five to fifteen dogs are used in a team, according to the rules, but five to seven now is standard.



Musher Guiding His Sledge over a Snowy Trail in the "Christmas Tree Lands" of the North

A good lead dog is worth several hundred dollars. Patience and care are required in training the sled dogs. The driving is done by the voice, thanks to the animals' strange divination, that elusive quality defined as instinct.

STOP VIBRATION OF BUILDINGS WITH "MATS"

Slots running the length of some of the buildings in New York city, at a point where the sidewalks meet the structures, call attention to an interesting engineering feat to prevent vibrations, caused by the subway trains, from being communicated throughout the structure. The steel uprights, which carry the railroad tracks and the streets above them, have been isolated from the building, and a free space of four inches horizontally and two inches vertically provided. In places where the railroad foundations and those of the buildings rest on the same bedrock, vibrations were kept from passing from one unit to the other through the rock by means of specially designed mats, consisting of pan-shaped sheets of lead, imbedded in concrete on the rock foundation. Above this was a layer of asbestos, another of sheet iron, still another sheet of asbestos and, finally, one more covering of lead. This mat effectively kept sound vibrations from reaching steel in the buildings.

Material Enough for a Dozen Ordinary Chairs Was Required for This Huge Wicker One, Used as Advertising Display on Water Tank

WICKER CHAIR TEN FEET HIGH ADVERTISES FACTORY

One of the largest chairs ever manufactured, has been constructed by a California factory as an advertising display on its water tank. It is made of wicker with leather upholstery, is nearly ten feet high and could seat several adult persons at one time. Enough material for a dozen ordinary chairs was used for the huge unit, which would comfortably accommodate a person about twenty feet tall.

TRACES OF VANISHED FORESTS DUG UP IN OREGON

Traces of trees of a species unknown today, but which probably grew in Oregon many thousands of years ago, have been found between strata of lava along the Deschutes river. The discovery further strengthens the belief of geologists that great forests flourished in primeval Oregon only to be obliterated by floods of molten rock which poured from huge fissures in the ground and covered large areas before cooling. In one locality, the explorers found as many as thirty different strata, each representing a separate flow of lava.

LIQUID WAX FINISH REVIVAL OF OLD ART

Centuries ago, the Egyptians produced mural paintings and other decorations in wax which has kept its colors almost as fresh as the day it was applied. This process is now duplicated, in some respects, in a method for treating walls to give them durable, washable finishes in a wide variety of colors and designs. A liquid wax is put on after a coat of sizing. This gives the wall a glaze which may be polished, after thorough drying, and lends itself to the application of colors. A gallon of the wax will cover 700 square feet and there is no danger of brush or lap marks. It may be easily removed without injury to the rest of the walls.

LABEL MOISTENER OF RUBBER CANNOT BE BROKEN

To moisten labels or envelope tabs, a rubber holder for water has been introduced in England. It is simply a tube corked at one end and with a bit of felt at the other to absorb the water. Pressure wets the felt if it becomes too dry.

Moistener with Filler Cork Removed, and Showing the Felt Stopper That Absorbs Water

TESTER FINDS TRACK DEFECTS FOR RAILROAD SAFETY

Ten pens write an accurate record of the condition of the track and roadbed of the Santa Fe railroad as an inspection car whirls along. Since the report is registered under actual train stresses, it reveals situations that might escape detection when the rails are not in use, saves time and expense and enables the section foremen to locate the weak spots exactly for immediate and thorough repairs. If the track is too high or too low on one side, a pen makes note of the fact, due to the departure of the testing car from perfect balance achieved by a special gyroscope. If the rails are not exactly the right distance apart, other pens designate this on the moving strip of paper, and still others show if there are faulty conditions with respect to the rail joints. The outfit has been satisfactorily employed over more than 100,000 miles of track. One of the interesting discoveries it revealed was that, in some instances, tracks in front of the foremen's homes had been neglected because the workers did not wish to be accused of "loafing" close to the dwellings of their task masters.

WOODEN PRONGS INSIDE VIOLIN TO IMPROVE TONE

Greater resonance and better tone in a violin are said to be effected by installing a set of wooden prongs an eastern craftsman has introduced. They are fastened to the end pin block of the instrument and are of spruce, carefully tuned to vibrate properly with the strings. The invention is intended especially for strengthening the tone of weak violins and for obtaining greater resonance and carrying power. Each set of prongs is adjusted and installed to suit the particular instrument, which is subjected to thorough tests before the addition is made.

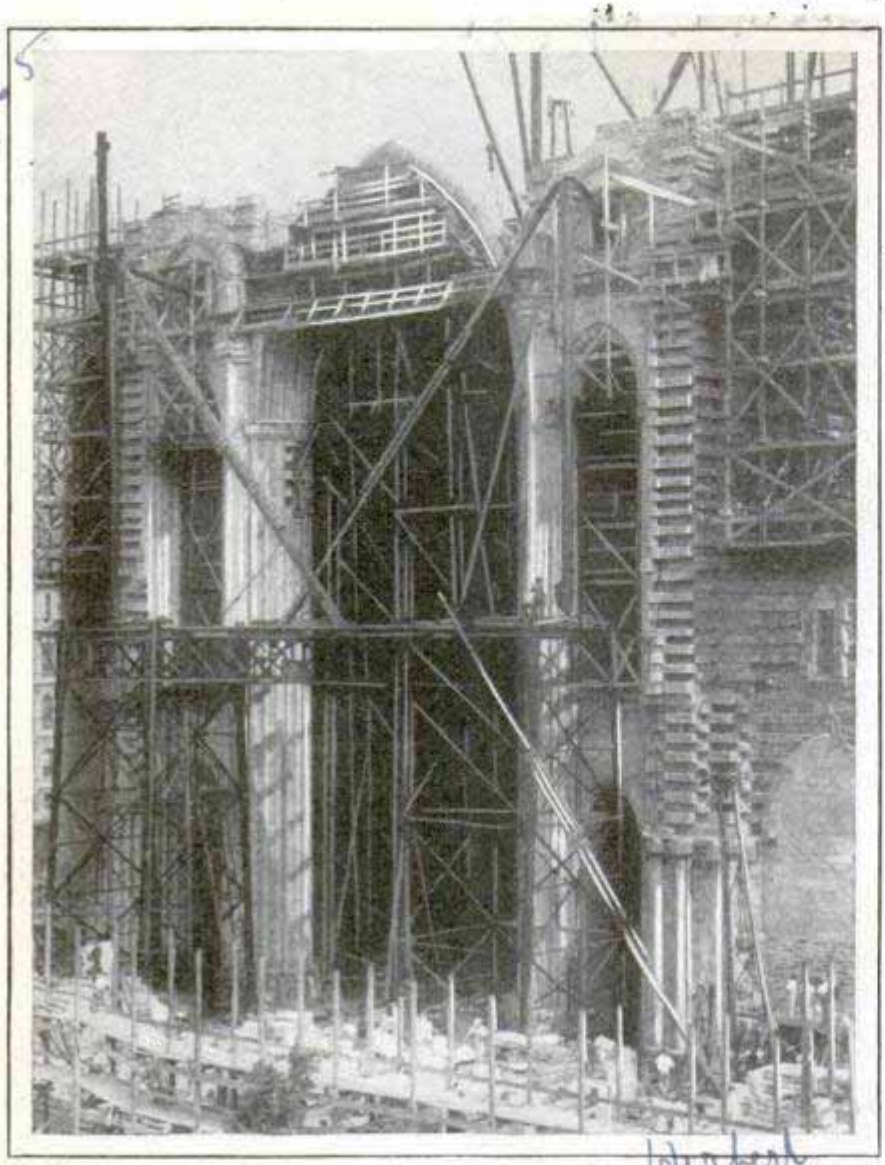
Part of the Outfit for Making Hollow Steel Axles and Other Units in Faster Time

HOLLOW AXLES QUICKLY MADE FROM STEEL BILLETS

Hollow or solid railway axles can be turned out in ten to fifteen seconds on a machine devised by a Californian, reports from Los Angeles state, whereas nearly half an hour is required to make an axle by the usual methods. Hollow steel shafting of irregular shapes and sizes, couplings for all sizes of pipe and many other products are obtainable from the outfit, which is said to have won the approval of steel men who have inspected it.

PEN AND PENCIL IN KNIFE GRIP SAVE POCKET SPACE

Contained in the handle of a small knife, lately introduced in Paris, is a fountain pen and variety of pencil that has a constantly sharp point. The blade is suited to wide usage and both writing units fit snugly within the handle when the knife is in the pocket, thus being always easily accessible, saving room and protecting the fabric.



Typical Arch Construction on Cathedral of St. John the Divine, in New York City, to Be One of the Largest Churches in the World

SETTING ARCHES OF CATHEDRAL TESTS ENGINEERS' SKILL

One of the exacting tasks in connection with the building of the Cathedral of St. John the Divine in New York city, was the erection of the seven huge transverse arches of the nave. With the aid of special derricks and tackle, the big units were swung into place and set with practically no deviation from the prescribed measurements.

CHEMICALS TO STAIN CONCRETE PRODUCE LASTING EFFECTS

By means of a chemical staining process, lately developed, concrete floors, walls and other surfaces of this material are given durable and pleasing color tones and finishes of a variety of shade and character. It penetrates deeply, helps give the cement a more durable and weather-proof surface and, by reacting on the lime in the concrete, gives the color a permanent foundation. Tests have shown that cement, treated in this way, only becomes slightly gray on the places exposed to extremely heavy duty, and such changes of color are always harmonious with the rest of the surface. Where other factors permit such a plan, the walls of a residence, for instance, may be made only of concrete, omitting the lath and plaster, and then stained with the chemicals in such a way as to closely resemble an ordinary wall.

CYCLE AMBULANCE TO AID FIRE VICTIMS

For emergency service, a Berlin fire department has equipped a special motorcycle and sidecar as an ambulance. It is useful in making quick trips where the traffic is heavy, is cheaper to operate than an automobile and is especially serviceable in work among fire engines and hose lines.

© Henry Miller

Motorcycle Sidecar Ambulance for Emergency Service in the Berlin Fire Department

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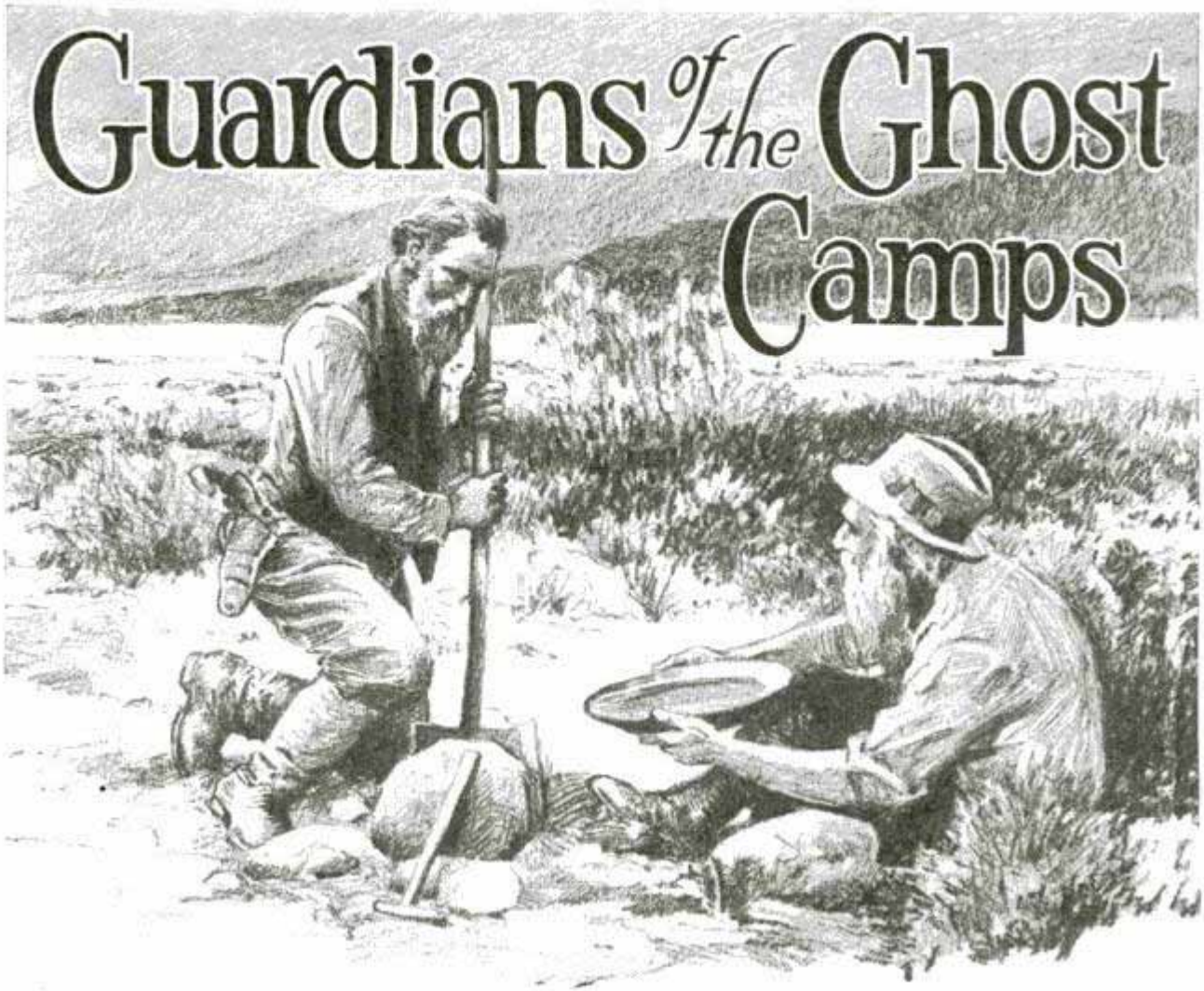
Guardians of the Ghost Camps



Grizzled Desert Rats Still Plod the Burning Sands of Death Valley, the Panamint and Funeral Ranges behind Patient Burros, to Chip Rock and Pan Sand in Search of Gold

By KATHLEEN CAESAR 345 W. 23rd St. New York

GOLD panning, the oldest and most primitive form of mining, is still carried on in the west. Nearly every "ghost camp" of romance still has its old-timers who are "scratching around" as in early days and finding wages in gravel that no longer attracts the adventure seeker who wants to make his fortune in a hurry.

These men are the one connecting link between the old and the new in mining. Generally they are veterans of the early gold rushes. Talk with them and you will get thrilling tales of the times when millions were being scooped out at the grass roots. Theirs is the saga of buckskin sacks filled with nuggets, of wide-open towns and of gulches that swarmed with men who were busy with the pick and pan and rocker and sluice.

Without exception, these man are confident that the old camps are going to "come back"—that new deposits of placer gold will be found, or that the surface riches will be outdone by lode discoveries of permanent value. No doubt this is the real lure which keeps them in the camps that were long ago deserted by the great hordes of gold seekers. Meantime they pan out enough golden residue to keep them going. Their wants are few—a little cabin in the hills, sufficient bacon and flour for a bachelor's needs, and tobacco enough to help a man dream of the gold that may show up in tomorrow's panning.

Drop in on one of these old-timers and you will think you are back in the days of Bret Harte. You will be allowed to pan for yourself. You will see the shovelful of dirt scooped out at bedrock and will be taught the trick of "sloshing" the water around the pan until the sand and lighter gravel disappear over the rim. Then you will get the thrill of seeing the yellow specks in the bottom of the pan.

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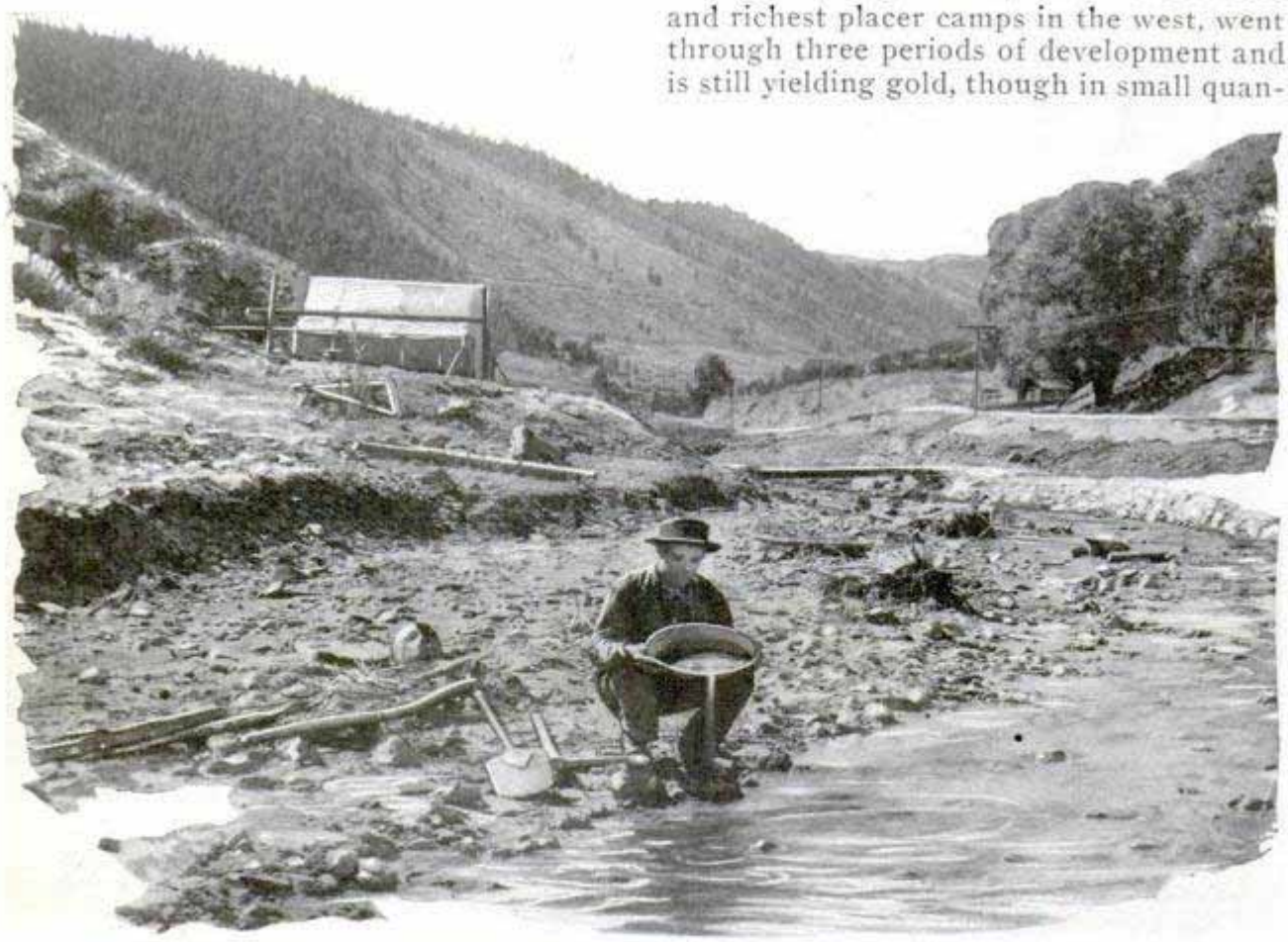
By the time you have finished a single panning, your back aches. You have been twenty minutes or more in getting a few flakes of gold. The miner picks them up carefully on his finger tip and puts them in the palm of your hand. You have earned ten or perhaps fifteen cents, is the verdict. Not much of a pan, but may be the next one will be better. There is the catch in it—the next one. The pan is wiped out carefully and put in the sun to dry for a few minutes. Then the pay dirt is thrown in and the operation is begun all over again. The miner does it this time, and he works with surprising deftness. The panful of dirt dwindles steadily, the gold, being heavier than the surrounding contents, sinking to the bottom.

Many deep-mining camps of today were placer "diggings" in the beginning. This is particularly true in California. In Colorado the first great discoveries were made by panners on the Platte, near the present site of Denver. Then two intrepid prospectors, Jackson and Gregory, made richer discoveries in the mountains, a few miles west of the first diggings. These rich placer discoveries were on top of enormous ledges of gold-bearing ore. Both Idaho Springs and Central City, the scenes of the Jackson and Gregory discoveries, have been deep-mining camps for years and yielded millions when ways and means of smelting the ores were found. But, though the great rush of placer miners subsided years ago, "color" can still be taken out of some of the creeks adjacent to these old camps. Only recently it was announced that a miner had been making good wages out of a creek near Denver which was supposed to have been exhausted of its riches years ago.

Leadville, at first known as California Gulch, was a placer discovery. When its surface riches no longer yielded plentiful returns, the few hopeful miners who were left there began digging deeper and found the rich ore on which Leadville was built. The same kind of faith animates the "ghost camp" guardians today. Every one of them is confident that he has another Leadville at his feet.

Virginia City, Mont., one of the oldest and richest placer camps in the west, went through three periods of development and is still yielding gold, though in small quan-



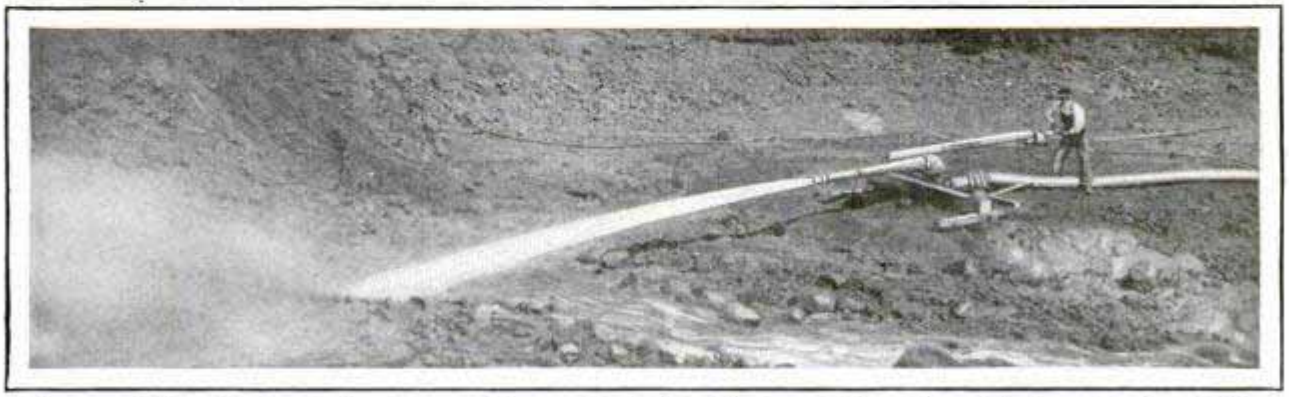
A Tent Camp for the Summer, Pick, Shovel and Pan Form All the Equipment Needed to Work the Placer Sands at Idaho Springs; Auto Road Near By Offers the Only Company

A Veteran of Virginia City's Palmiest Placer Days Still Twirls His Gold Pan beside the Creek, to Extract Day Wages and an Occasional Overlooked Nugget

tities, to a faithful few who will not believe that the sands which have made many millionaires are "through." The first miners who flocked to the camp, on its discovery in 1863, took out millions with gold pan, rocker and sluice. Then, after the camp began to slump and most of the miners had left, there came a horde of Chinese, working over the old diggings. In turn the Chinese disappeared, and then came the gold dredge, making what appeared to be the final "clean-up."

Virginia City was located under most romantic circumstances. It was discovered by Bill Fairweather, who, with a party of fellow prospectors, had been driven out of the Crow Indian country, farther east. The Indians did not encourage prospecting. On their way back to the camp of Bannack, from which they had started, Fairweather and his companions camped in a gulch near the Tobacco Root mountains, about eighty miles northwest of the present west entrance to Yellowstone national park. Fairweather, with the true prospector's instinct, panned some gravel—with astonishingly rich results.

The prospectors went back to Bannack, after having sworn to keep their discovery secret. But the news leaked out and, when they started back to the scene of



Compare This with the Patient Panner Above; the Hydraulic Gun of the Placer Diggings Washes Whole Hillsides into the Sluice Boxes under the Force of Tremendous Pressure

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their discovery, they were followed by almost the entire population of Bannack. A meeting was held, and Fairweather and his companions agreed to let the others in on the bonanza if the discoverers were given the choice of locations. This was agreed to, and soon Alder Gulch, as it was called, swarmed with miners. Virginia City was the metropolis, and was the scene of wild life outdoing the violence of the California mining camps. For months there was no law. Among the 30,000 gold seekers who flocked to the new diggings there were many outlaws. The only medium of exchange was gold dust. More than $10,000,000 in dust was washed out of the sands in the first three months of the camp's existence.

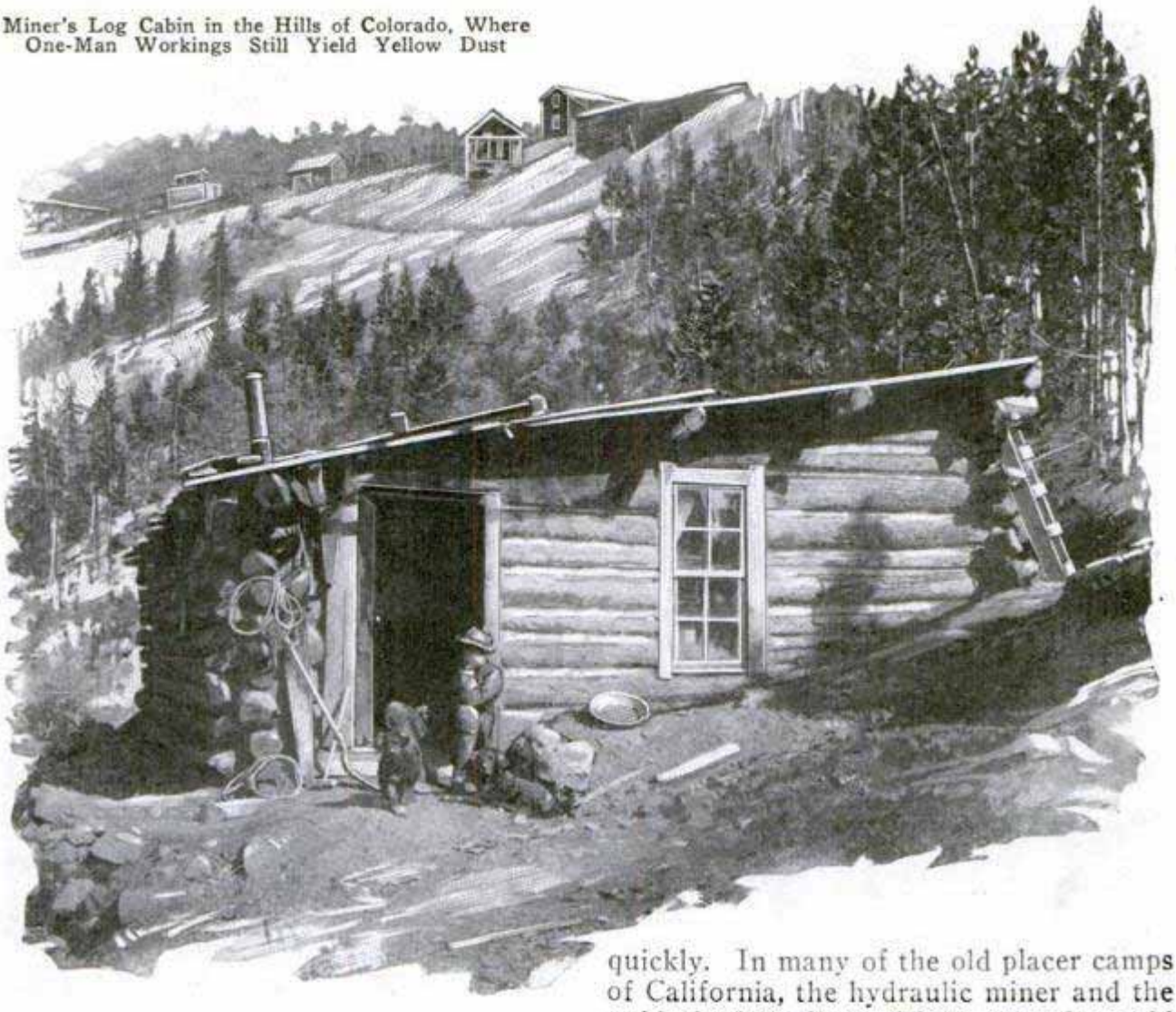
Then came the bandits, or "road agents," as they were called. Miners who had "made their pile" and had started back for the "States," were robbed and murdered. More than 200 of these returning miners were known to have fallen victims to bandits. The road agents were organized under the direction of Henry Plummer, a California gambler and outlaw, who had been elected sheriff of both Bannack and Virginia City. The miners' courts, which were held in the open, offered no relief. The entire camp was helpless under the domination of Plummer's strong, oath-bound organization.

Then the Montana "vigilantes" were secretly organized. Raids were made on the "Robbers' Roost" and other headquarters of the road agents. Confessions were obtained which implicated Plummer and all the other "officers" of the road-agent gang. A score of them were hanged, one of the first being Plummer.

Today Virginia City numbers about 350 residents. For miles there are great piles of gravel—melancholy reminders of the visitation of the gold dredges. If you wander along the gulch, you may see an occasional miner panning in the little creek which at one time literally had a golden bed. If he is fortunate enough to find a rich deposit that has been overlooked, he may make an easy "stake," but such chances are slim. About the best

Working the Last Remaining Sluice at Virginia City, in a Gulch That Yielded Millions a Few Years Ago

Miner's Log Cabin in the Hills of Colorado, Where One-Man Workings Still Yield Yellow Dust



he can hope for is "wages." Yet there is always the element of chance—the gamble that keeps men striving against odds.

If a miner finds something in an old camp which has been overlooked, he may put in a sluice and conduct his operations on a more extensive scale. The sluice is a long, roughly constructed trough, in the bottom of which are cleats, or "riffles." Dirt from bedrock is thrown into the sluice, and, as it is carried down by the water, the gold is deposited in the riffles. Recovery is made by quicksilver.

Optimism is the main motivating instinct behind all these men who give a flesh-and-blood semblance of reality to the old "ghost camps" of the west. Idaho has numerous camps which have come and gone, but you will be almost certain to find in each one at least one cabin inhabited by a miner who will tell you of the glories that he thinks are certain to return.

The same is true of many of the gold camps of Nevada, which rose and fell quickly. In many of the old placer camps of California, the hydraulic miner and the gold dredger have driven out the gold panners. But, in spite of this constant moving on to make room for up-to-date successors, the gold-pan miner has managed to survive—one of the few living reminders of the early gold rushes.

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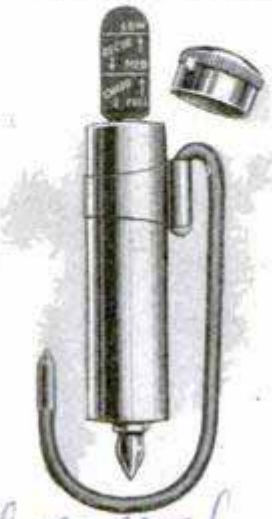
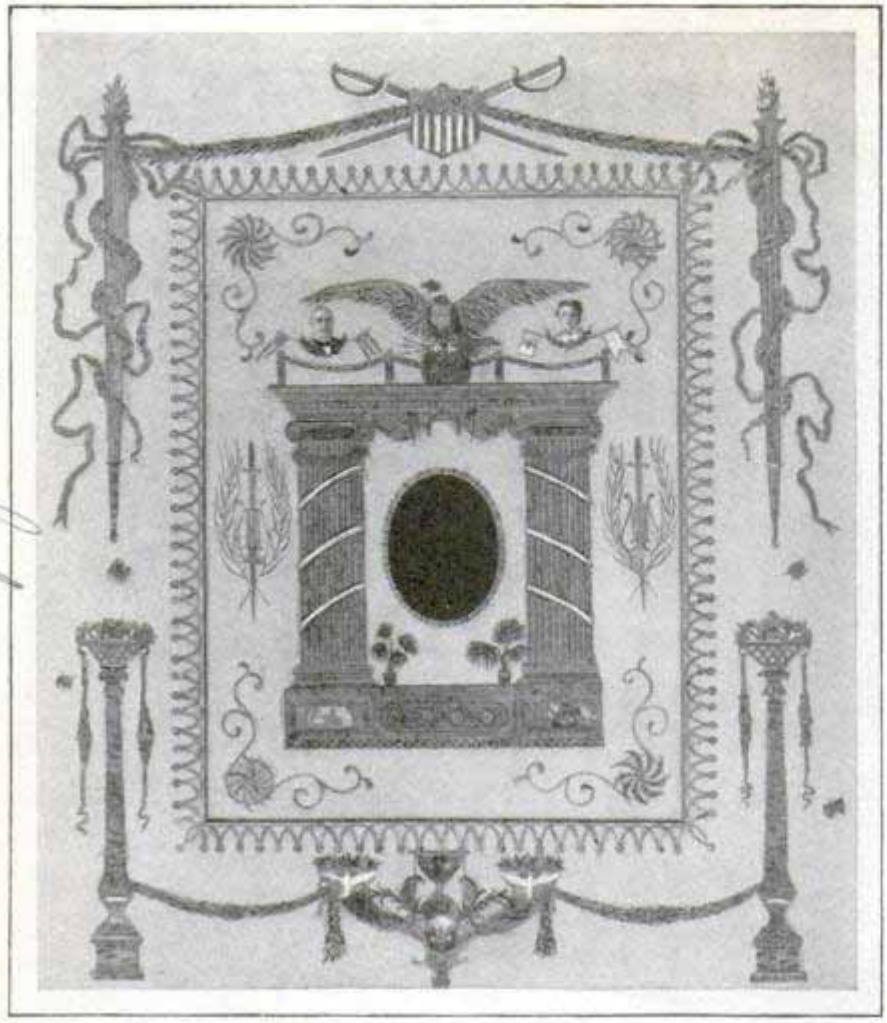
POCKET BATTERY-TESTING UNIT SAVES TIME AND TROUBLE



Carried in the coat pocket, a storage-battery tester, somewhat resembling a tire gauge, quickly indicates the condition of the battery on a tabulated extension. It is operated simply by placing the two points on the battery terminals.

General Instrument Corp. 477 Broadway New York.

Chicago. 258 Jackson Blvd.



Brightly Colored Bits of Thousands of Postage Stamps Were Cut and Mounted to Form This Picture Frame

PATTERN IN POSTAGE STAMPS DECORATES PICTURE

Postage stamps of many colors and designs have been used by a Pennsylvania man in fashioning an ornate picture-frame pattern. About two years were required to finish it, spare time only being given to the work, and several thousand pieces of stamps were used. Those printed or embossed in fadeless ink were selected and the original hues of the decoration have been well preserved.

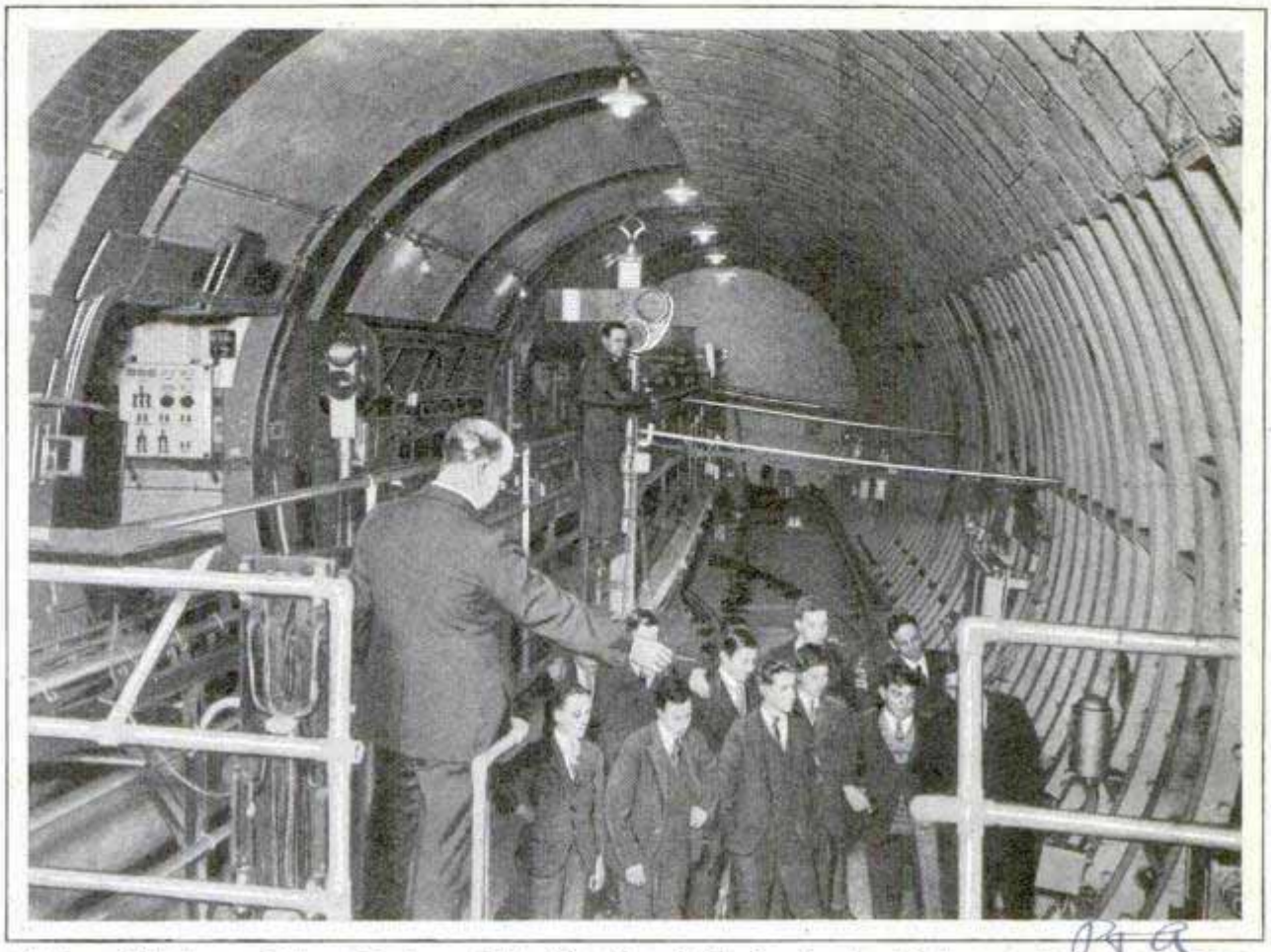
SWARMS OF ARCTIC MOSQUITOES TORMENT EXPLORERS

Arctic regions are popularly supposed to be nearly devoid of plant and animal life, but at least one hardy insect is found in far northern latitudes in great abundance. That is the mosquito, which has seriously hampered many explorers. Recently Lieut. Comm. Donald B. MacMillan added his testimony to that of many others who have ventured into the far north. He wrote from his winter quarters in Labrador: "It is quite warm and pleasant. But the mosquitoes! For the last two nights I have had hardly an hour's rest. I am one mass of bites from head to foot. I put up my bed curtains to keep them out, but they would get in and seemed to make the curtains an excuse for not getting out." Other explorers before MacMillan reported frequent assaults by the pests. Alfred H. Harrison records the case of two dogs that were stung to death by mosquitoes in northern Canada.

BUTTONHOLE VASE KEEPS FLOWER FRESH

Concealed behind the coat lapel, a small vase, partly filled with water, keeps the bouquet from withering. The holder is simply a slender metal tube and is held securely in an upright position to prevent the contents from spilling.

Close View of the Lapel Vase, Showing How It Is Concealed, and Flower in Position



Subway Schoolroom Where Members of the Operating Staff of a London Underground Railroad Receive Training in Various Duties; It Is Equipped with the Apparatus of a Regular Station

SCHOOL IN SUBWAY STATION TEACHES SAFETY SIGNALS

Trains never arrive at a certain subway station in London, for it is not a station at all, in the ordinary sense of the word, but a school where members of the operating staff are taught the various signals employed and other important details of operation. The room is completely equipped with all the paraphernalia of a regular station so that the students can see just what occurs under running conditions.

SEND COLORED PICTURE BY WIRE ACROSS THE CONTINENT

Successful transmission of a colored picture by wire from New York to San Francisco, is one of the latest developments of the wire-transmission process. The feat was accomplished by using three negatives, a red, a blue and a yellow, each being sent separately and then put together at the receiving end. The entire picture was transmitted in thirty minutes. Another development of sending illustrations by wire was recently tested in handling pictures, reading matter and a map and then assembling all the units into the form of a complete advertisement.

HOLDER FOR AUTO SKID CHAINS LATEST SAFETY UNIT

Simplicity and added safety are claimed for a pressed-steel rack attached to the auto wheel for connecting skid chains. It permits the use of chains of various types and combinations to attain the best result, as many as forty different ways being available with the holder and as many as twelve treads. It is not necessary to jack up the wheel to attach the chains and as the rack is self-centered, the strain is uniformly distributed.

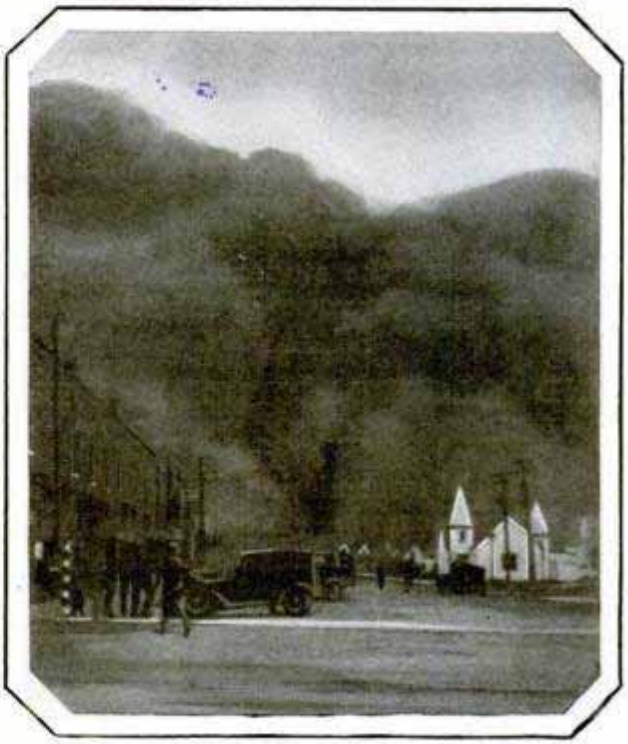
HAND-CRANK ORANGE SQUEEZER SAVES WASTING JUICE

A Turn of the Crank Squeezes the Orange, Protecting the Hand from Juice and Reducing Waste

Practically every drop of juice is said to be extracted from oranges with a hand-cranked squeezer recently introduced. It operates on the same principle as the larger power outfits, protects the hands and saves time.

ELECTRIFIED DUST STORMS OF THE WEST

Dust storms, which charge barbed-wire fences to a high voltage, stall automobiles by interfering with their ignition systems and add new worries to radio listeners by causing even worse static than thunderstorms, are among the curious phenomena that visit sections of the great plains east of the Rockies in dry seasons. In northwestern Kansas, during one of these disturbances, a man became curious about the amount of electricity his aerial was collecting and connected it with the ground wire through a thirty-two-candlepower light. He obtained as brilliant light as when it was connected with his automobile battery. No thunder or lightning occurs during these electrified dust storms, nor is there any known relation between them and earth magnetism. Any metallic object insulated from the earth seems to become highly electrified as the fine dust blows past it. One rancher relates an instance of driving cattle in one of these odd electrical displays and seeing a glowing light at the tips of the horns of each steer. When autos were new to the country, drivers were puzzled to find their engines stalled in these disturbances and nothing apparently wrong with them. Finally, one ingenious man guessed the trouble and tied a chain to the rear axle of his car. The static was promptly dissipated and the car ran properly. For a long time it was believed that "wind friction" was the cause of the electrical display. Probably the first person to attempt a scientific explanation was Prof. W. A. Douglas Rudge, who conducted experiments in South Africa. He removed both ends from a five-gallon can and stretched a fine wire gauze over one end. A considerable portion of the dust blowing into the can was retained and the charge of electricity it carried was given up and carried to an insulated sphere. This was invariably found to be positive. Another conductor took on the negative potential of the air. On some occasions sparks three-fifths of an inch in length were obtained, showing at least 40,000 volts. This indicated quite clearly that the electricity with which metallic objects were charged was carried from the surface of the earth by the minute dust particles.



Unusual View of an Approaching Dust Storm; It Often Produces Interesting Electrical Effects

2421

By EARL CHAPIN MAY Sharon, Conn.

A SUAVE showman, whose white hair framed a broad forehead and whose bright eyes gleamed with the enthusiasm of an impressario, announced in true ringmaster style:

"This, ladies and gentlemen, concludes the performance of Heckler's original flea circus, which must be seen to be believed. Thank you for your kind attention. Please give the doortender fifteen cents as you pass out."

The worldly wise New Yorkers, who had clung to a brass rail around the illuminating exhibition while Prof. William Heckler put his trained fleas through their paces, filed out, each depositing fifteen cents with the guardian of the gate before mingling with the throngs in Forty-second street. It was the only time I'd ever seen an audience in Manhattan's celebrated theater district pay real money after seeing a show.

"Don't your patrons sometimes refuse to pay?" I suggested to the professional gentleman.

"Not when they have beheld the wonders I perform," he declared convincingly. "I give my public its money's worth. You see, I've made a scientific study of fleas, and of humanity, for nearly thirty years. My fleas are all skilled professionals.

"The two facts which are featured at the very top of my printed program are, 'Every action is visible to the naked eye,' and 'No danger of desertion.' The first refers to the brilliantly illuminated white table upon which my stars do their acts. I do use a small magnifying glass to show some of the finer points of my company, but the juggling, boxing, racing, and other things which add to my circus' popularity, are easily discernible by anyone with ordinary eyes. And there are no desertions from my company. Once I have made an actor out of a flea, that actor remains in my service for the rest of its natural life.

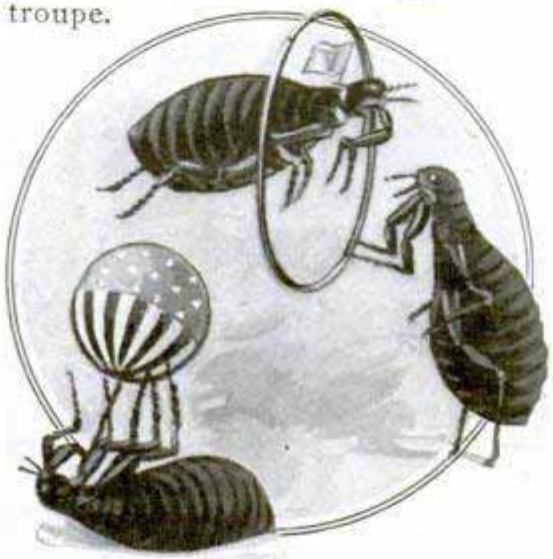
"You see this bottle filled with cotton and raw recruits. Well, after they have been with me a little while I take a few of them and put them in a short glass tube. Although there is no apparent superdevelopment of the legs, a healthy flea can jump what would be to us the equivalent of half a mile. It is the nature of a flea to jump. My kindergarten fleas therefore begin to jump as soon as their feet are on something hard and smooth. But after they have jumped and hit their backs and

heads on the glass, they begin to favor a more sedate gait. Walking is good enough for them.

"Then, one by one, each is given its liberty, with reservations. It is turned loose with a tiny collar around its neck and to this collar a tiny gold chain is attached. Each time the liberated flea essays to leap, it finds the chain's weight retarding it. In a day or so, if it is an intelligent flea, it gets tired of jumping and becomes a mere pedestrian. But it wears a collar and is attached to a cart or cannon or something heavy after that. Hence no member can desert my troupe.

"Although a common animal flea must devour some blood about every six hours to keep in condition, a human flea can get along without sustenance for four or five days. But I never put my pupils to the test. I time their feeding largely by the number of performances. Naturally the more energy consumed in entertaining, the more fuel I must feed them to sustain their strength. So, on exhibition tours, I usually feed them once each day."

Suiting the action to the word, Prof. Heckler turned up the cuff of his dinner coat, and with tender solicitude lifted, by its collar and his own small pincers, each member of his troupe gently onto his left arm, where they settled down for dinner.



Football Players, Soldiers, Acrobats, Cyclists and "Society People," Greatly Magnified from the Flea Circus' Galaxy of Performers

Although he was inspired by that youthful vision of a trained-flea exhibition in Germany many years ago, the dean of flea-circus ringmasters entered the profession accidentally. Fate brought him to Coney island and his mechanical skill led him into the building business. From reconstructing residences he began to manufacture devices carried by traveling carnivals.

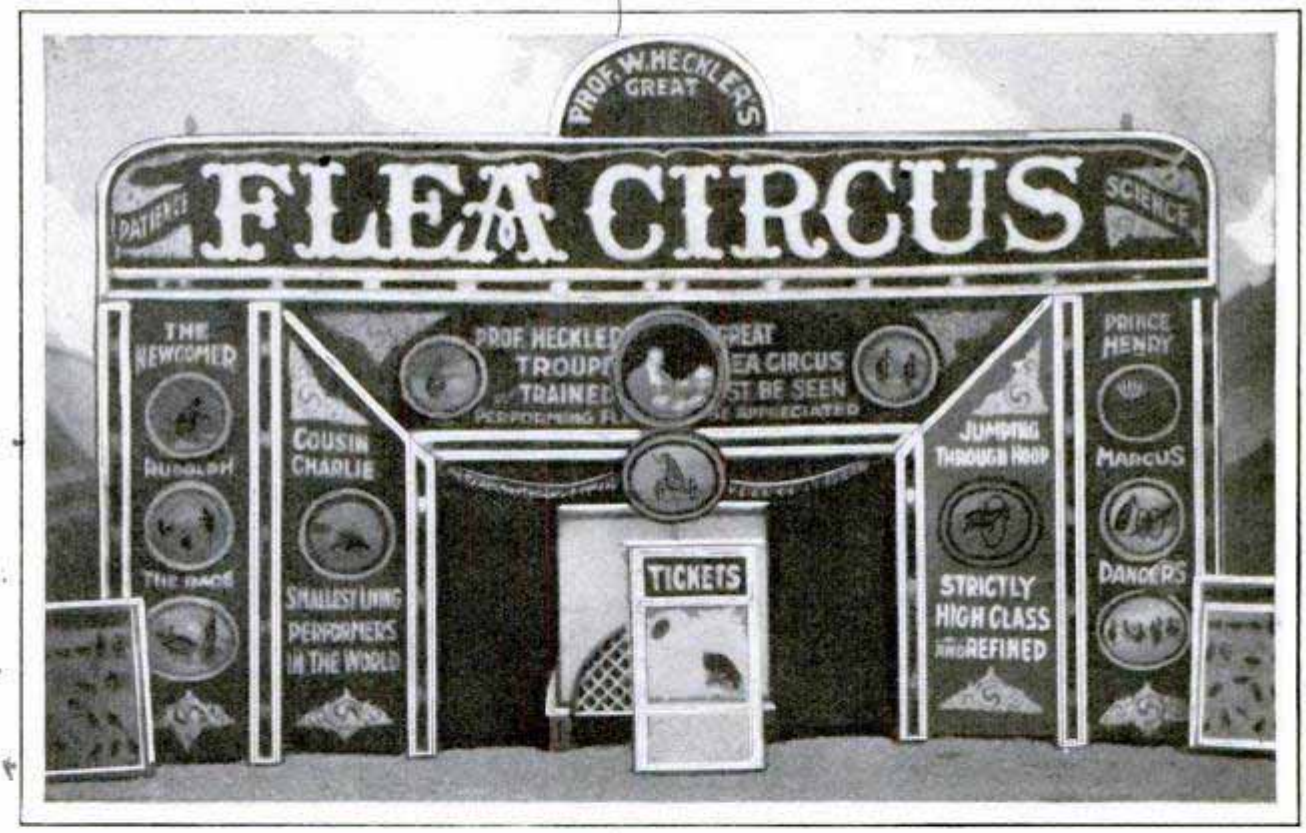
In the course of time he went on the road as a carnival concessionaire. One day, in Florida, he found himself possessed of a flea-circus concession among other features designed to gather the dimes while money flowed along the Midway. But the youth engaged to exploit the trained fleas lacked showmanship. Business was not good. So Mr. Heckler took over the exhibit designed to prove that fleas have intelligence.

"I won't say this intelligence is unlimited," he admits, "but I will insist that each flea has a pronounced individuality. I can tell by watching a new candidate whether it will be adept at juggling or do better in a sparring match. Once I have determined on some new flea's professional activities, I concentrate on that flea. Hence you find that 'George Hough,' one of my stellar performers, will, at the word of command, pick up a large pith ball weighing twenty-five times as much as 'George,' and juggle it like a Japanese. It takes three weeks to train a flea and few of them live in harness more than three months.

"I found, two months ago, that 'Rudolph von Hapsburg' was a natural strong man among its kind. So I hitched it to the tiny merry-go-round which, though only two inches in circumference, weighs 5,000 times as much as it. At first I made 'Rudolph' pull that dead weight. Then I got to figuring that it was doing all the work with its two front feet. So I contrived a harness by which the merry-go-round could be pushed around.

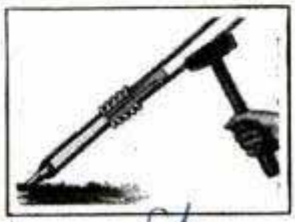
"Is there money in the flea-circus enterprise? There is if you study it scientifically. I took in $250, in dimes, in one day at the Rochester exposition. Almost any Friday at a good county fair is good for $100 in cold cash.

"A man named 'Mueller' put on the first trained-flea circus in America at the old Stone and Austin museum in Boston nearly forty years ago. Another German named 'Auvershleg' had the first traveling flea circus in this country thirty years ago. In addition to fairs and museums, I get as high as $25 for a private exhibition."



CLAMP TO HOLD GUY WIRES SAVES MUCH TIME

Based on a method followed in the logging camps to keep the guy wires of derricks used in handling the big logs from slipping, a wedge clamp has been adapted for similar purposes with electric-line poles. It is much more quickly applied than bolt clamps, and tests have shown that the lowest strain at which it slips is 9,000 pounds. Under ordinary conditions, on a three-eighths-inch strand, it is said to hold as much as two three-bolt clamps, and another advantage claimed is that it can be attached in one-fourth the time.



By Pushing the Bars Back and Forth, Passengers Propel This Boat at Considerable Speed and Receive Beneficial Exercise; There Is a Small Propeller at the Rear

HAND-PROPELLED WATER SLED GIVES HELPFUL EXERCISE

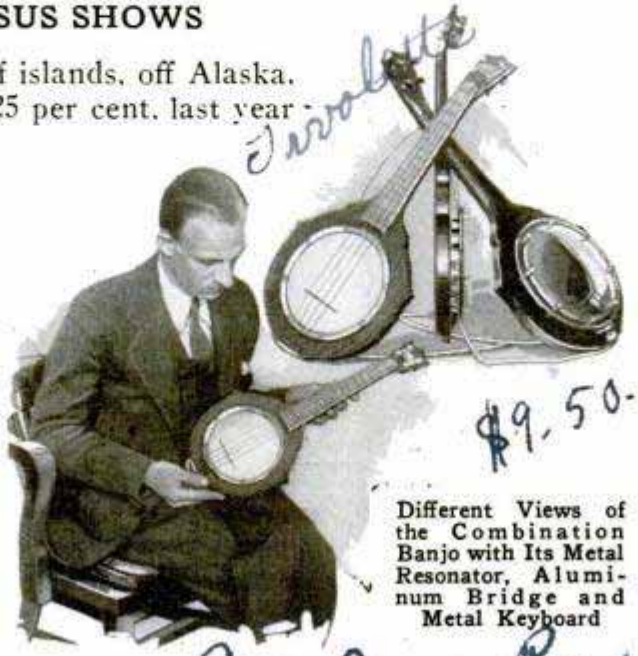
Speed of six to nine miles an hour can be attained in a water sled recently introduced in Paris. It carries two persons and is propelled with a slide bar that is pushed back and forth. This action turns a small propeller at the rear. This double-pontoon hull promotes safety and easy riding.

ALASKAN SEALS ON INCREASE LATEST CENSUS SHOWS

Seals on the Pribilof islands, off Alaska, increased 47,589, or 6.25 per cent, last year over the preceding year, according to a careful government census. The count shows that there were 808,870 seals in the rookeries. Last summer, 263,566 pups were born, but there was an unusual death rate among them. Males for the breeding reserves were given hair bobs and hundreds were tagged with metal markers. During the season, 27,000 seals were killed for the pelt market.

THREE-IN-ONE BANJO PLAYED LIKE A UKULELE

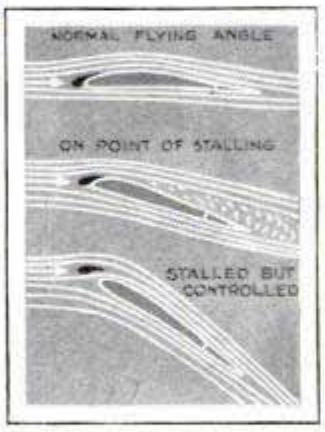
Features of a tenor banjo, a banjo mandolin and the ukulele banjo are combined in a recently introduced instrument which has a metal keyboard to simplify playing, an aluminum bridge in place of the ordinary wooden one and several other distinctive details. It is strung and played like a ukulele and is constructed like a banjo. A metal resonator and an adjustable metal tone chamber and head-tightener are special features. The calf-skin head is adjusted with a nut. The instrument is said to be very easy to play and produces a wide variety of pleasing tones.

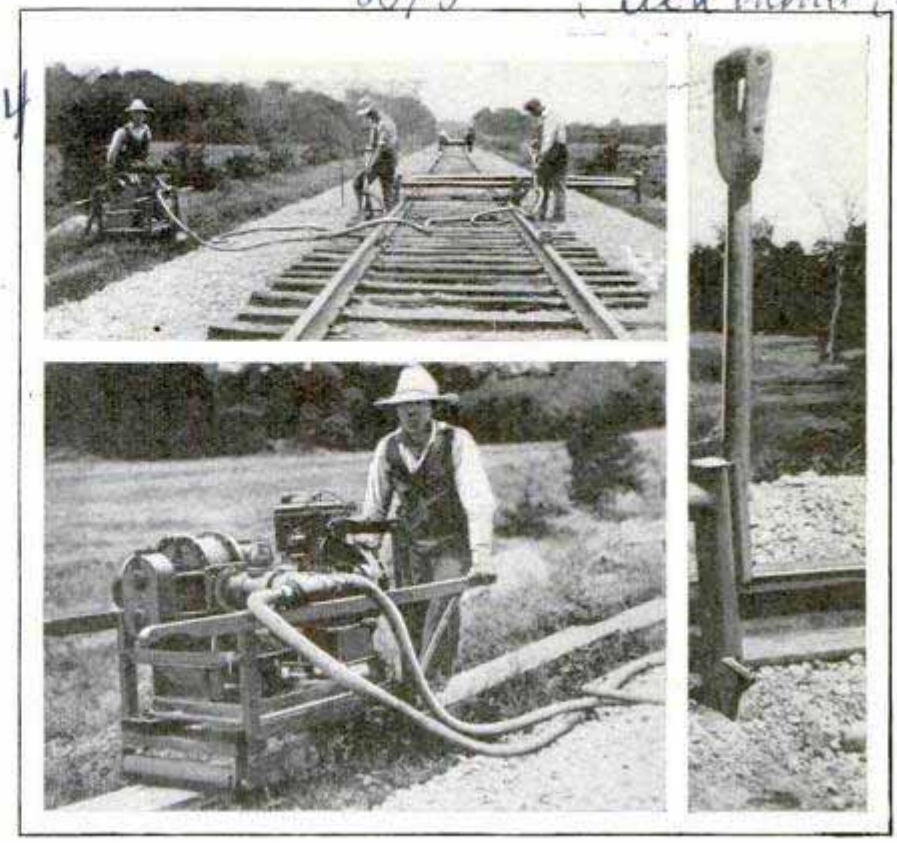


Different Views of the Combination Banjo with Its Metal Resonator, Aluminum Bridge and Metal Keyboard

AIRPLANE RIGHTS ITSELF WITH SAFETY SLOT

An automatic slotted wing, which, without any assistance on the part of a pilot, keeps a plane in level flight, even when it is moving at less than flying speed, and prevents "stalling," which usually ends in a side slip or tail spin and an accident, has been perfected in England. The slotted wing was developed as far back as 1925, but the control mechanism remained too complicated to permit its general adoption. The new device works of itself. In principle, the so-called wing slot is a short section of movable wing attached on top of the regular wings of the plane, at the front edge and near the wing tips. There it occupies about the same position as the movable ailerons or flaps at the rear of the wing. In normal flight, the flap of the slot lies flat against the top of the wing, with the air currents flowing over it. But when the tail of the plane drops and flying speed is lost, the air currents lift the flaps off the wing, and open the slot beneath them, the effect being to increase the wing surface. Stalling is followed immediately by one side of the plane dropping, and, as the pilot moves his control stick to correct this, a connecting wire closes the slot on one side, killing the extra lift on that wing, while the opposite one, on the wing which has fallen low, remains open and furnishes the necessary extra lift to level the plane. The U. S. army has purchased the American rights to use the device on all war planes.





Courtesy Pennsylvania Railroad

Men Using the Tampers, Close View of the Air-Compressor Outfit and of One of the Tamping Units at the Right

AIR-DRIVEN BALLAST TAMPER AIDS RAILROAD WORK

Patents have been granted on a compressed-air driven tamper to pack down the gravel and cinders used for railroad ballast. It replaces hand work and is said to permit the introduction of the materials under the ties in such a way that a better track results, being more uniform and stronger. The outfit is easily rolled along the sod line by two men and is said to do three times as much work as can be done by hand methods.

TAPE MEASURE IN LEAD PENCIL IS ON SPRING REEL

Always ready for use, a tape measure in the end of a lead pencil shows inches on one side and centimeters on the other. A spring reel facilitates manipulation of the tape.

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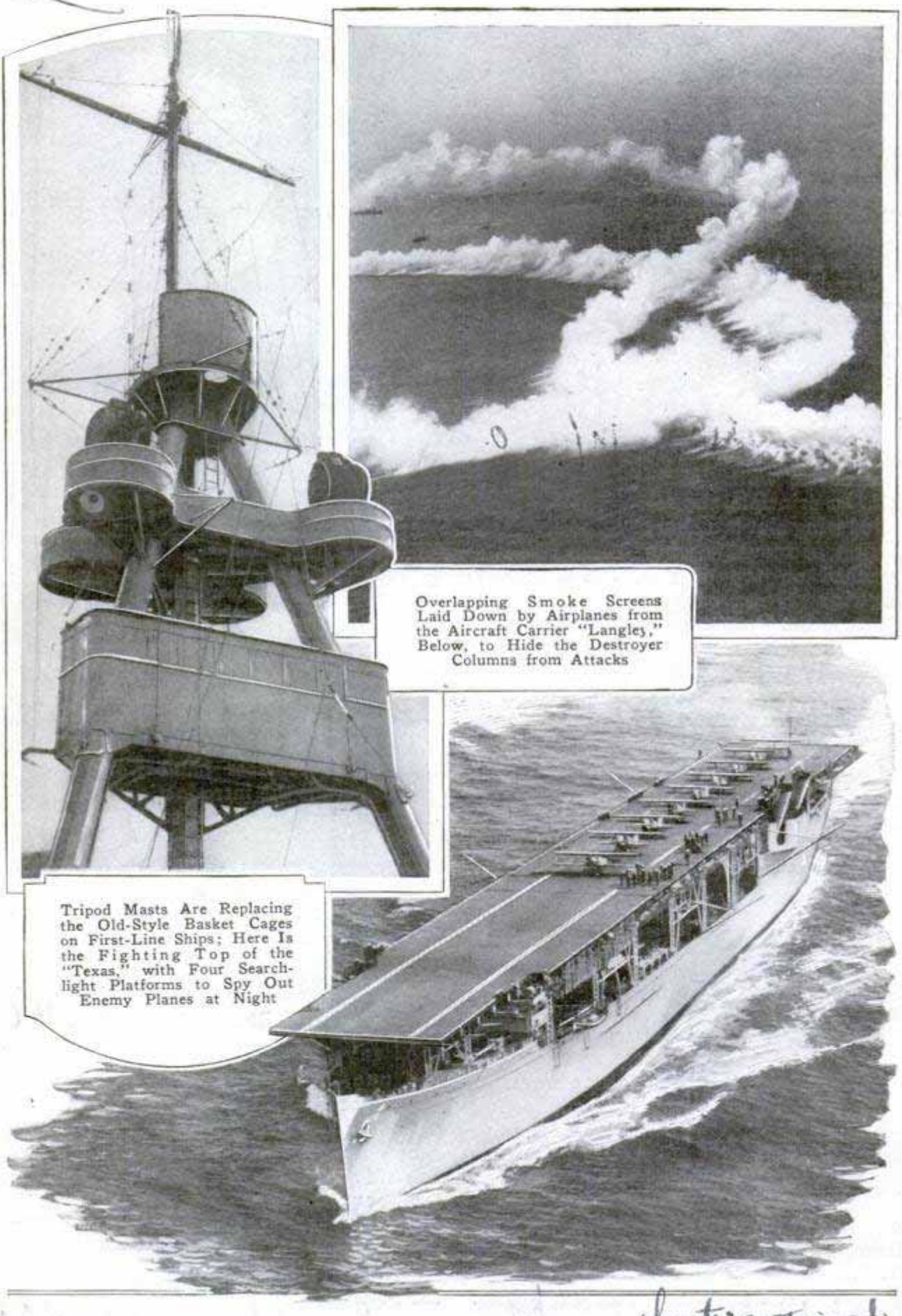
NAVY TUNES UP FOR AIR OFFENSE AND DEFENSE



Overlapping Smoke Screens Laid Down by Airplanes from the Aircraft Carrier "Langley," Below, to Hide the Destroyer Columns from Attacks

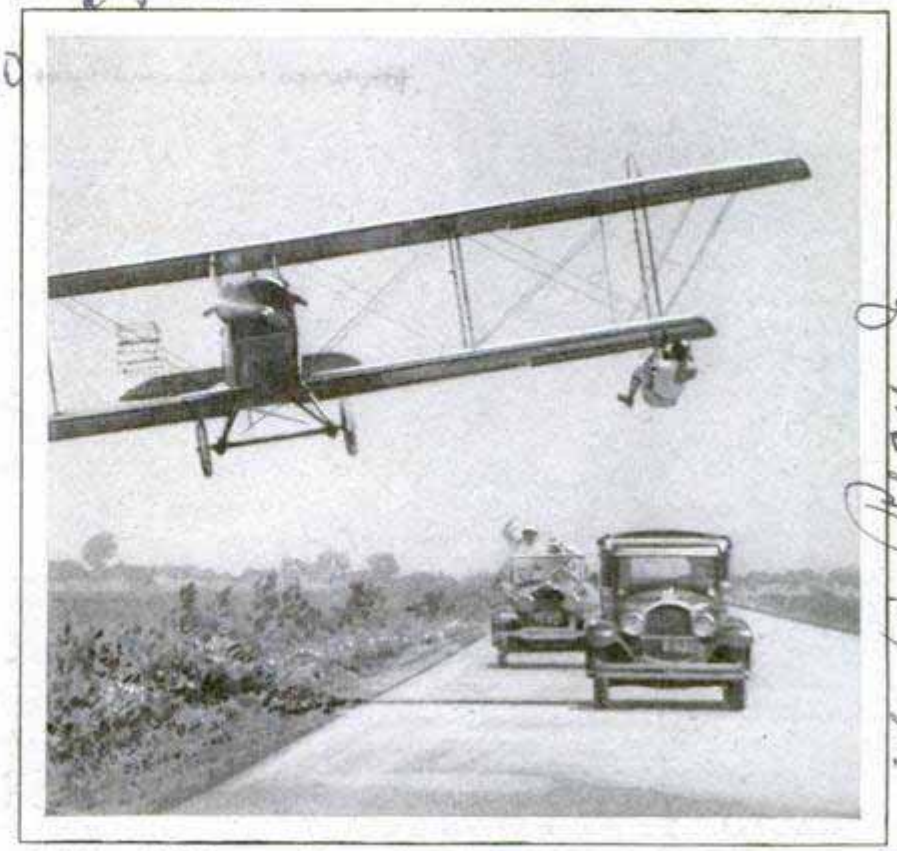
Tripod Masts Are Replacing the Old-Style Basket Cages on First-Line Ships; Here Is the Fighting Top of the "Texas," with Four Searchlight Platforms to Spy Out Enemy Planes at Night

International

Материал защищенный авторским правом

GIANT SEA WALL COSTS THREE MILLION

One of the greatest engineering tasks ever attempted in the south is nearing an end in the completion of the twenty-four-mile reinforced-concrete wall that protects the Old Spanish trail between Biloxi and Pass Christian, Miss. It cost $3,400,000 and has been financed chiefly by funds from a gasoline tax. Among the materials required were 7,000 tons of steel, 185,000 barrels of cement and thirty carloads of drain pipe. The wall guards the paved beach highway that skirts the shore and insures safety for a number of beautiful and historical spots along the trail. Spaces between the barrier and the road have been filled in with material pumped up by dredges and are being converted into park areas.



Al Wilson Climbing to Airplane Wing from Automobile without the Aid of a Ladder; Stunt Also Tested Pilot's Skill

LEAP FROM AUTO TO AIRPLANE DONE WITHOUT LADDER

With airplane and automobile going at about seventy-five miles an hour, Al Wilson, stunt man for the movies, swung from the car to the wing of the plane and climbed safely aboard the ship as it zoomed upward. This feat has been performed a number of times with a rope ladder but never without, the stunt historians declare. Another of Wilson's exhibitions involves roping the landing gear of one airplane while standing on the top of another below it.

ELECTRIC PRESS FOR TROUSERS REDUCES TAILORS' BILLS

Operated by current from a lighting socket, an electric presser for home use is said to give a tight, smooth crease, prolongs the life of the cloth and is simple to operate. The trousers are clamped between the two units of the press, the electricity turned on and, in a few moments, the garments are neatly smoothed. But little current is consumed, the manufacturers assert, and there is practically no danger of scorching the articles.

Creasing His Trousers with Electric Current

¶Names and addresses of manufacturers of articles described in this magazine will be promptly furnished, free, by our Bureau of Information.

Mowing Down Trees with a Tractor; a Cutter Attachment in Front Slices Off the Brush and Small Growth

TRACTOR THAT MOWS TREES HELPS CLEAR LAND

Preparing millions of acres of fertile land, in southern Manitoba, Saskatchewan, Alberta and other sections, for cultivation, can now be done at reduced cost with a tractor that pushes a powerful cutter ahead of it to slice off the small poplar, willow and other trees that grow in great abundance. Clearing this land by hand methods has been slow and laborious, preventing the farmer from enjoying the benefits of one or more seasons' crops. The cutter consists of two four-foot knives sliding diagonally along the ground on either side of the tractor in an "A" frame. The trees fall in windrows for quick burning. After they have been cut, the tractor is hitched to a big breaking plow which pulls up the roots so that they can be collected and burned, or it covers them up so that they will not interfere with later cultivations. The chief advantage of the tractor equipment, the manufacturers point out, is that the land can be made ready for growing crops years earlier than with hand methods.

TEN-MILE ICEBERG IN MAGELLAN STRAITS

Due to severe storms off Cape Horn, a number of large icebergs were driven into the Straits of Magellan, late last fall. Navigators reported as many as thirty during the passage through the 300-mile course of the straits. One was ten miles long and several reached a height of 1,000 feet. The region is 2,500 miles from the south pole and is not uncommonly visited by icebergs, but seldom are there so many and such large ones as were seen last season, sailors declare.

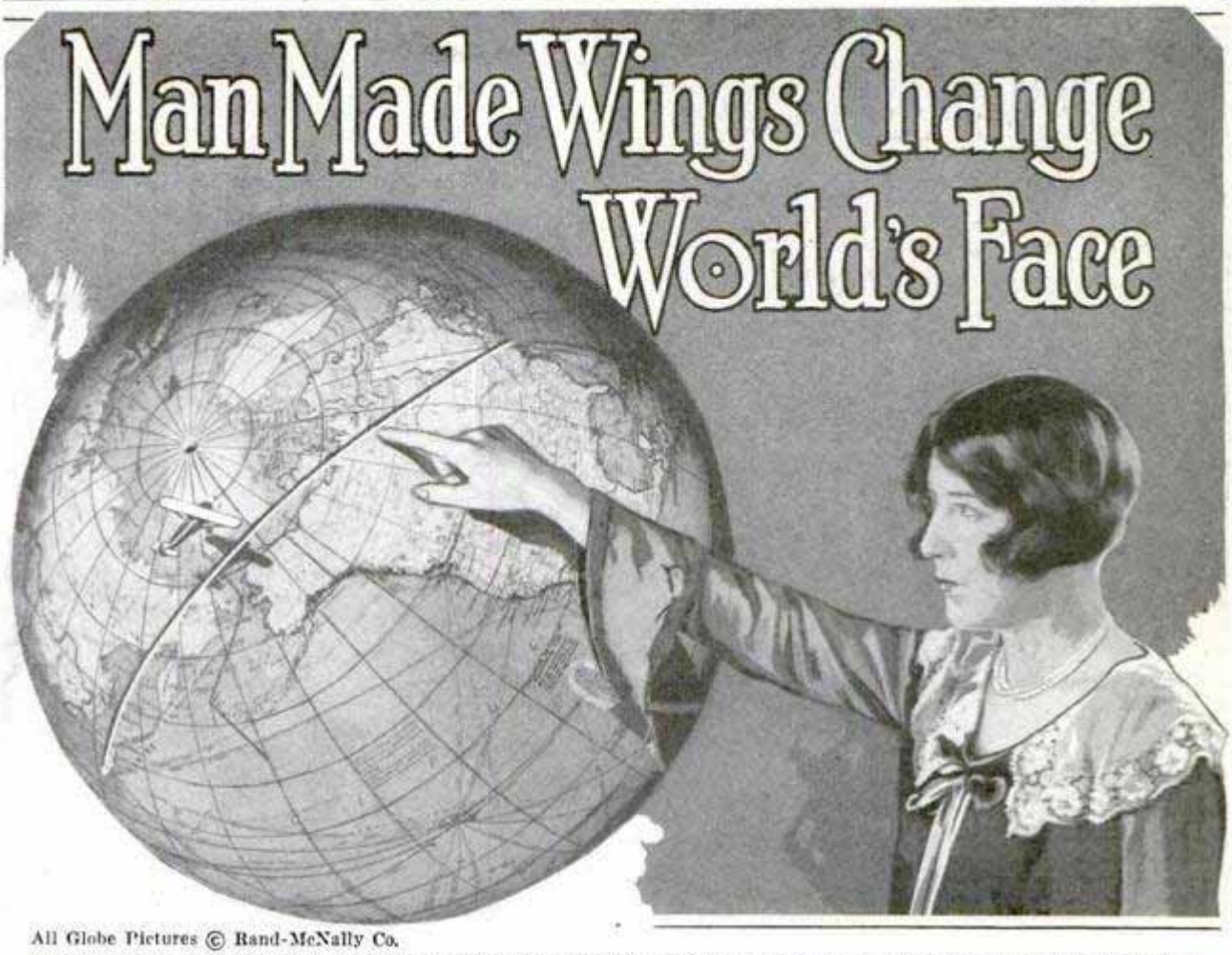
SAFETY VALVE ON BLOWTORCH PREVENTS EXPLOSIONS

Greater Safety Is Claimed for This Blowtorch with Automatic Valve; It Burns Gasoline or Kerosene

Fitted with an automatic safety valve, which is said to eliminate danger of excessive pressure and to prevent explosions, a blowtorch now on the market burns gasoline or kerosene and has adjustments to give the best results from different grades of fuel. A single opening in the tank eliminates unnecessary holes for pump, brackets and filler plug. A pistol-grip handle fits the hand.

3325 Cont. Norman C. McLoud
2720 Maryland Ave
Baltimore Md

Man Made Wings Change World's Face



All Globe Pictures © Rand-McNally Co.

Proving That Tokio Is Northwest Instead of West of New York; the Shortest Air Route Leads over Hudson Bay, the Arctic Ocean and Wrangell Island, off the Siberian Coast

By J. EARLE MILLER

"THE flyers are following the great-circle course," to London, Paris, Rome or Hawaii, as the case may be. That announcement has appeared so often in the newspapers of late, that navigation, once a technical subject for mariners, has become of prime public interest.

What is a great-circle course, and why do they follow it instead of a straight line?

To begin with a great-circle course is a straight line—the shortest distance between two points. But the charts of the flyers' course, say from New York to Paris, show them going northeast from New York, up over New England, Nova Scotia, Newfoundland, and out over the Atlantic, to circle down again over Ireland and England, and thence southeast to Paris. The answer is that the charts, being flat projections of a portion of a globe, necessarily distort a straight line into a curve.

Studying the world as an entire globe, instead of a series of individual maps of different countries, revises many preconceived ideas about geography. For example, if you asked a New Yorker to point his finger in the direction of Japan, he undoubtedly would point west, because the usual route to Japan lies westward across the continent and the Pacific. Actually the direction to Japan from New York is northwest over Ottawa, Canada, the western side of Hudson bay, across the Arctic ocean north of Point Barrow, the northernmost point in Alaska, over Wrangell island, a frozen waste in the Bering sea, and down across Siberia and over the Sea of Okhotsk, far to the northeast of Vladivostock. The rail and steam course to Japan measures 7,800 miles and the direct route about 6,000 miles.

That's the shortest possible route from New York to the capital of Japan, and possibly, some day, it will be plied regularly by giant air liners. The world was stirred a few years ago by a story of unequaled

It's very truly,
INTERNATIONAL HARV
R COMPANY OF AMERICA

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The Air Route from New York to Singapore Passes Directly over the North Pole; at Right, a Globe Maker Pasting the Gores in Place

privation and death that came out of the Arctic when an Eskimo woman, survivor of a little party left on Wrangell island by Stefansson, the explorer, was rescued to tell of the death of her white companions. Everyone wondered why an explorer wanted to colonize and lay claim to a barren ice island in the far north.

Next, an American party took over the job of holding down Wrangell, and hoisted the American flag. The first word of them to reach the outside was the report of their arrival in Vladivostock, after having been forcibly removed from the island by a Soviet gunboat, which left a Russian party in their place and hoisted the red flag instead of the Stars and Stripes. Why, the world asked, were people fighting for such a useless island? The answer is that it is potentially one of the most useful landing fields in the world, for many of the future air-trade routes will pass over or near Wrangell.

The flight of Amundsen, Ellsworth and Nobile over the north pole in the dirigible "Norge" was a magnificent feat but, at first glance, it had no practical value. The men who made it, however, had studied geography from globes and realized that the north pole would be a landmark on many valuable trade routes of the future.

Mercator's projection of the rounded surface of the globe onto a flat plane, which is the standard used today for most maps, including those from which geography is taught in the schools, is the best all-around map yet devised, but it has resulted in some erroneous ideas about the shape of the continents and their relation to each other. Study a flat map and there appears to be no reason why an airplane leaving New York should go over Newfoundland, for the province appears to be but little farther east than New York city, and far off the course to Europe. But refer to a globe and you will find

Planes Flying from New York to Bombay Will Pass over the Tip of Greenland and Cross Northern Russia on Their Way to India

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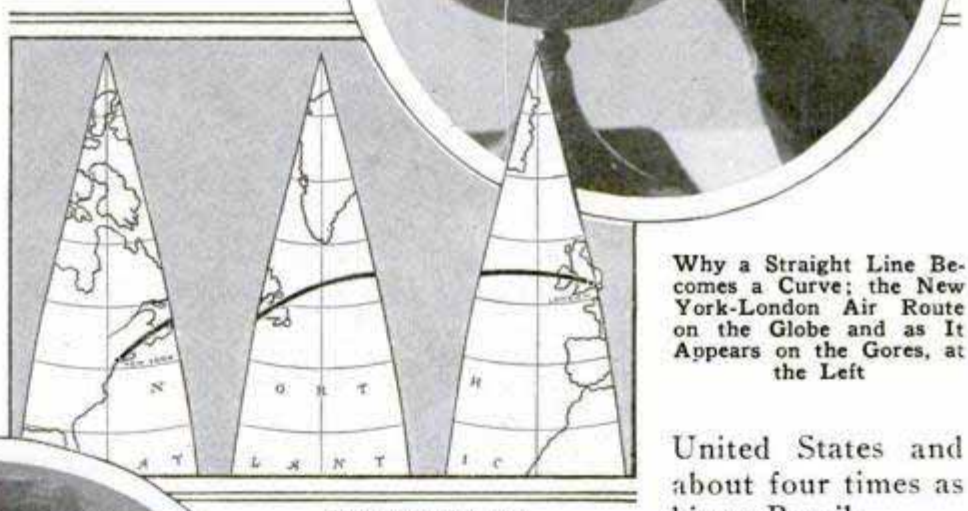
Newfoundland actually is far to the east of the Atlantic coast of the United States. Stick a pin in the globe at New York city, tie a string to it and then stretch the string across to London and you will have a straight line. Continue the string on around the globe until the other end comes back to New York and you will have a true great circle, of which the New York-to-London portion is an arc.

Look at a flat map and, because of the distortion which becomes greater and greater the farther you go from the equator, Canada appears to be vastly larger than the United States, whereas the actual difference is but slightly over 700,000 square miles. The same map shows the United States as, apparently, at least twice as large as Brazil, whereas the South American republic is actually the bigger. Africa, about half again as big as all North America, appears to be smaller, and all Europe, roughly the area of either the United States or Brazil, appears twice as large as the United States and about four times as big as Brazil.



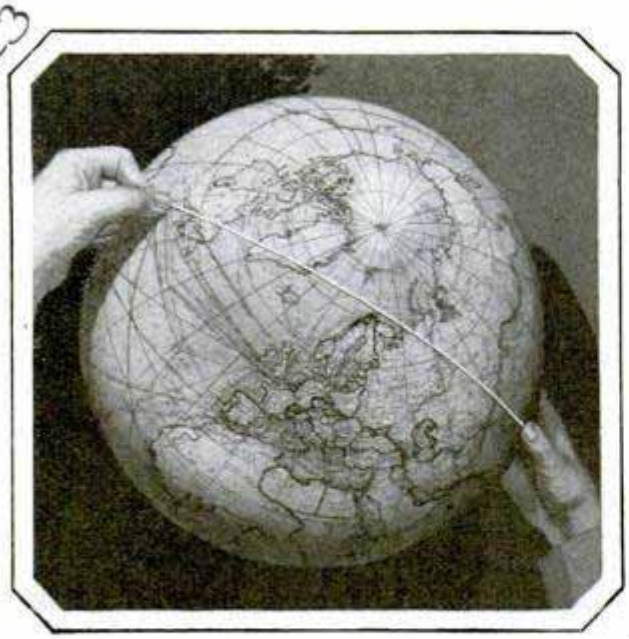
Why a Straight Line Becomes a Curve; the New York-London Air Route on the Globe and as It Appears on the Gores, at the Left

© Rand-McNally Co.

Draw an equator around an orange, and then cut the peel down in segments, from both "poles" almost to the equator line. Remove the peel and flatten it out and you have the answer, for the map maker has simply filled in the vacant spaces between the gores with land and water, distorting the actual land available to make it fit the hole. If you draw another line on your orange before you peel it, connecting two points representing the relative positions of New York and London, you will see, when you flatten it out, why this straight line becomes the curve shown on a chart as the great-circle course across the Atlantic.

Suppose you wanted to go from New York to Singapore by the shortest possible route. Singapore is almost on the equator. New York is almost halfway between the equator and the north pole. Yet the shortest route from one to the

Draw a Straight Line around an Orange, Corresponding to the New York-London Great-Circle Course, and You Get This Effect after Peeling



Byrd and Amundsen's Jumping-Off Place in Spitzbergen Will Be a Stop on the New York to Calcutta Air Route Some Day

other is directly over the north pole. The reason is that Singapore and New York are, within a few miles, exactly opposite each other on the earth. That being true, if you fly due north from New York to the pole and then due south from the pole to the equator, you will reach Singapore over the shortest possible route, about 9,700 miles, as compared with 12,000 miles by steam routes.

The "Norge" took off for its flight over the pole, as Byrd did for his flight to the pole and return, from King's bay, Spitzbergen, an island in the Arctic ocean far north of Norway and east of the northern end of Greenland. King's bay some day will be another important fueling station on a world air-trade route, for a plane flying to Calcutta from New York will pass over it, while a plane en route to Bombay would pass north of Iceland, over upper Norway and Finland, and then down across Russia far to the east of Moscow. The difference between the air route from New York to Calcutta and the sea route, by way of Gibraltar, the Mediterranean, Suez canal, Red sea and Indian ocean, is about 3,000 miles, as much as the distance from New York to Gibraltar.

Since Lindbergh hopped across the Atlantic and introduced great-circle courses to the front pages of the newspapers there has been a big demand for globes. In one of the larger factories where a great part of the maps and globes for schools are made, extra shifts are working overtime to turn them out. The making of a globe is a long and tedious process, requiring hand labor in the main. The first globes, which became popular immediately after the discovery of America, were either engraved on copper or painted by hand. Columbus, in his later voyages, and Magellan, both carried such globes in lieu of present-day ships' charts.

In 1507, though, Waldseemuller revolutionized the globe-making art by producing a globe covered with a map printed on segments, or gores, and his method is still used today.

AIR-DRIVEN LOG PLANER SPEEDS BUILDING OF SHIPS

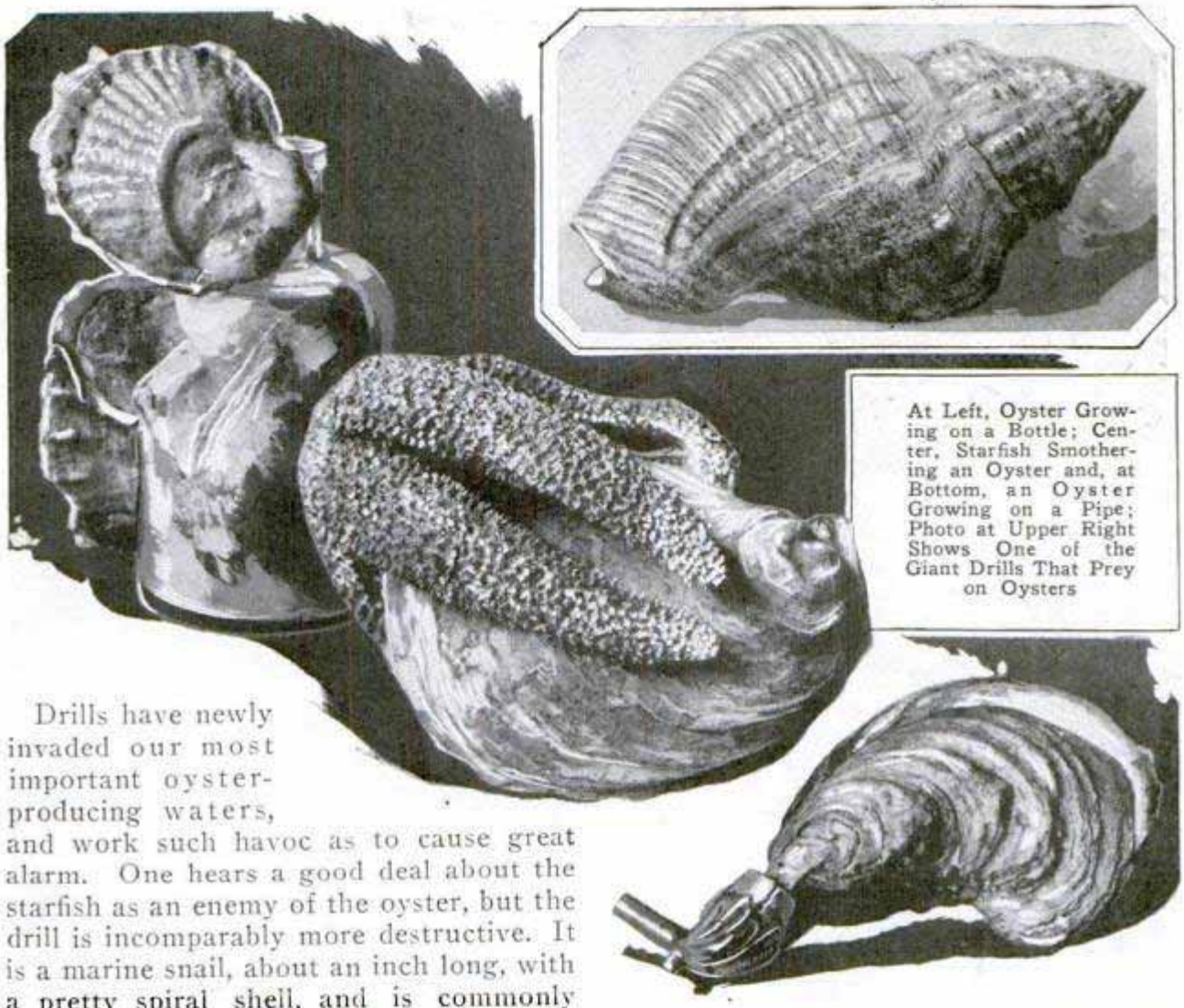
Capable of doing the work of six to eight men, a log planer driven by compressed air, has been introduced in ship yards and in plants where poles are prepared for lighting and power lines. It smooths the bark from a large forty-foot pole in about thirty minutes and operates at greatest efficiency under air pressure of eighty-five pounds. For planing timbers, smoothing decks, masts and spars or finishing other large units, the planer is intended to save time and work. It weighs

Planing a Big Log by Air-Driven Smoother; the Bark Is Quickly Taken Off without Damaging Wood

but sixteen pounds, has few parts and is simple to operate.

3426 Cont. René Bache
1823 S St, Washington D.C.

SCIENCE BATTLES "BURGLAR" OF THE OYSTER BEDS



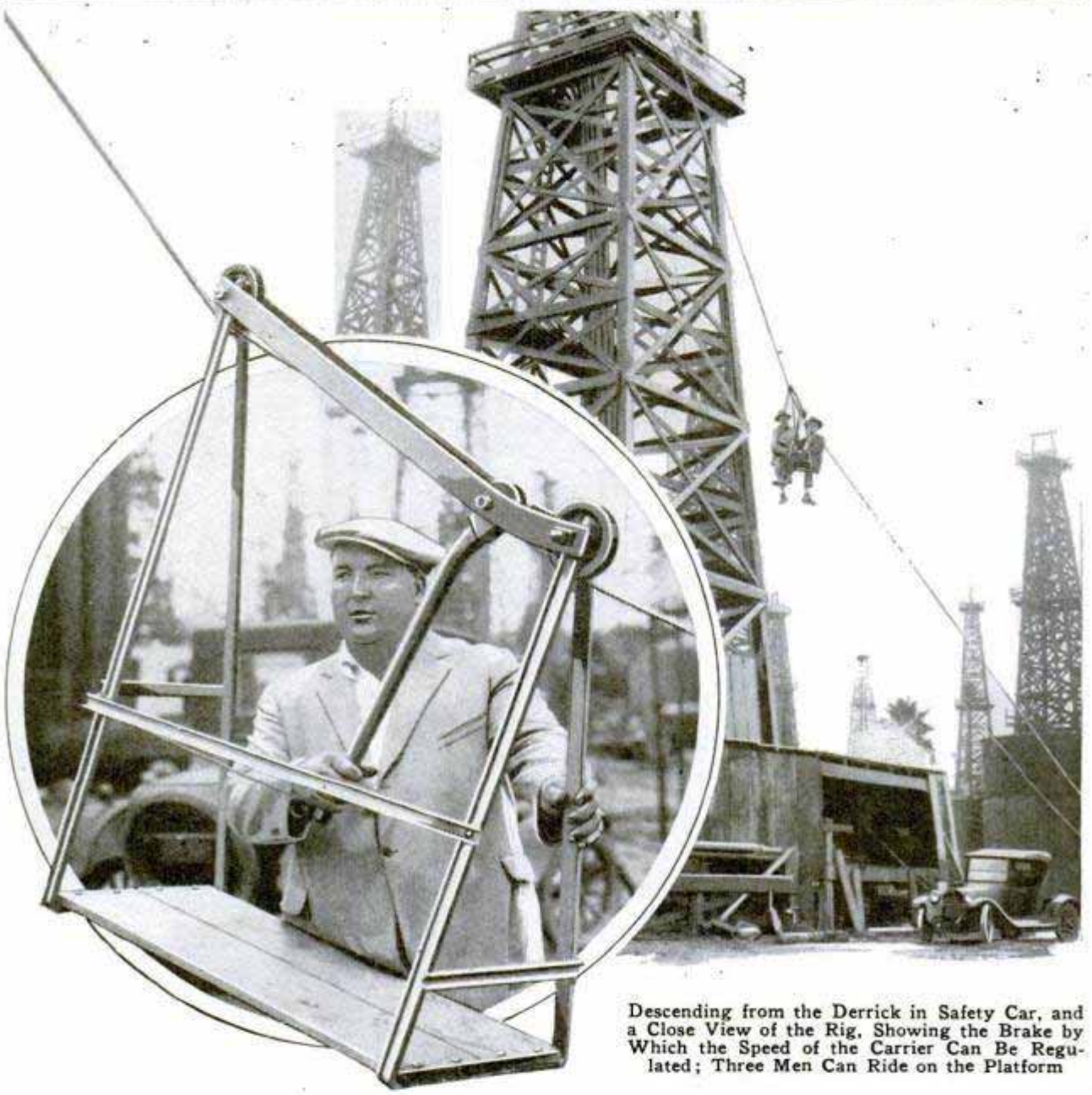
At Left, Oyster Growing on a Bottle; Center, Starfish Smothering an Oyster and, at Bottom, an Oyster Growing on a Pipe; Photo at Upper Right Shows One of the Giant Drills That Prey on Oysters

Drills have newly invaded our most important oyster-producing waters, and work such havoc as to cause great alarm. One hears a good deal about the starfish as an enemy of the oyster, but the drill is incomparably more destructive. It is a marine snail, about an inch long, with a pretty spiral shell, and is commonly called a "periwinkle." With a rasplike organ, protruded from its mouth like a tongue, it drills a hole through the oyster's shell, and then, extending the "tongue" into the body of its victim, it sucks out the flesh. The drill is nothing new. In Long Island sound and elsewhere it does enormous damage to oyster beds. But not until within the last three years has it been known in more inland waters. Having invaded those waters, in particular the Chesapeake and rivers flowing into that bay, it seems to have found them specially suited to its requirements, and is multiplying with amazing rapidity. In some localities it has killed fifty per cent of the oysters. So serious is the situation that the bureau of fisheries has undertaken an investigation. This work is now being conducted in a laboratory on Craney island, in the harbor of Norfolk, Va. Several hundred drills have been collected from near-by waters and placed in tanks for observation. It is the very young oysters that are attacked by the drills. Newly hatched oysters are free-swimming animals, very minute, of course, drifting about with the tides and currents for two or three weeks before they settle upon a shell or other hard object and adopt a sedentary mode of life.

HUNDREDS OF KINDS OF CHEESE MADE IN FRANCE ~~344~~ 4

France produces as many as 365 different kinds of cheese, but the chief of them all is Roquefort. This variety is protected by the government and made under specified conditions. Forty per cent of the 15,000,000 pounds prepared annually is exported. While much of the milk comes from Corsica, the enormous quantity of cheese is ripened in natural caves above the town of Roquefort. America takes most of the export and the best quality.

Francis Milloun
Cleveland Plain Dealer



Descending from the Derrick in Safety Car, and a Close View of the Rig, Showing the Brake by Which the Speed of the Carrier Can Be Regulated; Three Men Can Ride on the Platform

CABLE CAR TO SAVE OIL MEN TRAPPED ON DERRICK

Men trapped on an oil derrick by fire can slide to safety on a small tramcar introduced by a California engineer. It runs on a cable anchored some distance from the derrick and is governed by a brake to regulate its speed. From one to three men can ride in it. Without such an arrangement, the usual means of escape was by sliding down a rope and this often landed a man in the midst of the flames. Actual tests have proved that the rig works efficiently and, when not in use, it is easily stowed out of the way.

AUTO TRAILER DUMPS LUMBER WITHOUT BREAKAGE

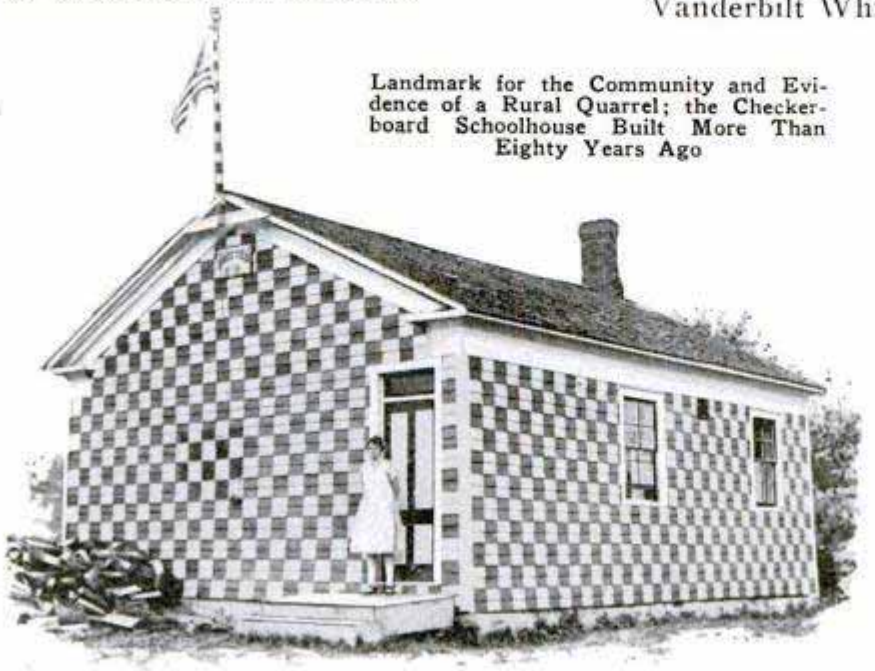
Unloading Lumber as One Unit

An automobile trailer for handling lumber and unloading the entire cargo at one time, without danger of breakage, has been invented by a Milwaukee lumber-yard official. The trailer

has cut handling costs from $2.50 to $1.24 per thousand feet through speeding up loading and deliveries. The trailer can be connected to the fore part of a horse-drawn wagon and hauled through the yards while assembling the load, the tractor trucks picking up the complete load for delivery. At the other end, the trailer bed is tilted and the entire load slides down as a unit. The truck then moves ahead and lowers the front end gently to the ground. Heavier loads are possible without violating highway restrictions, as the burden is distributed over six wheels instead of four. Six tons can be carried, with two and a half tons resting on the tractor truck and the balance on the trailer.

CHECKER PATTERN ON SCHOOL REVEALS ANCIENT FEUD

Near Franklinville, N. Y., a country schoolhouse with checker-patterned walls, serves as a landmark and recalls an amusing dispute that agitated the district more than eighty years ago, when the present building was erected. Some wanted it white and some wanted it red. The supporters of the white won at an election but the "reds" worked one moonlight night, painting crimson checks over the white sides. The pattern was allowed to stand. Not many years ago, the checkers were painted over with a modest gray, but old settlers created such a furore that the original decoration was restored.



Landmark for the Community and Evidence of a Rural Quarrel; the Checkerboard Schoolhouse Built More Than Eighty Years Ago

Model of Huge Statue of Columbus for the Port of Palos, Spain, Whence the Discoverer Set Sail

HUGE STATUE OF COLUMBUS WILL CONTAIN SHRINE

A monument in honor of Columbus is to be erected at the Port of Palos, Spain, the town from which the discoverer started on his voyage to the new world. It is being designed by Mrs. Gertrude Vanderbilt Whitney and will cost approximately $500,000. With its pedestal, it will be 114 feet high. The figure of Columbus alone will be seventy feet in height. Large statues of King Ferdinand and Queen Isabella will be incorporated in the base, which will also house a shrine about twenty feet square. Its walls will be decorated with maps of the world as it was supposed to be in the days of Columbus. The monument will be of granite. Dedication is planned for Columbus Day this year.

Cont. Joseph S. Edgerton
c/o Washington Times
Washington, D.C.

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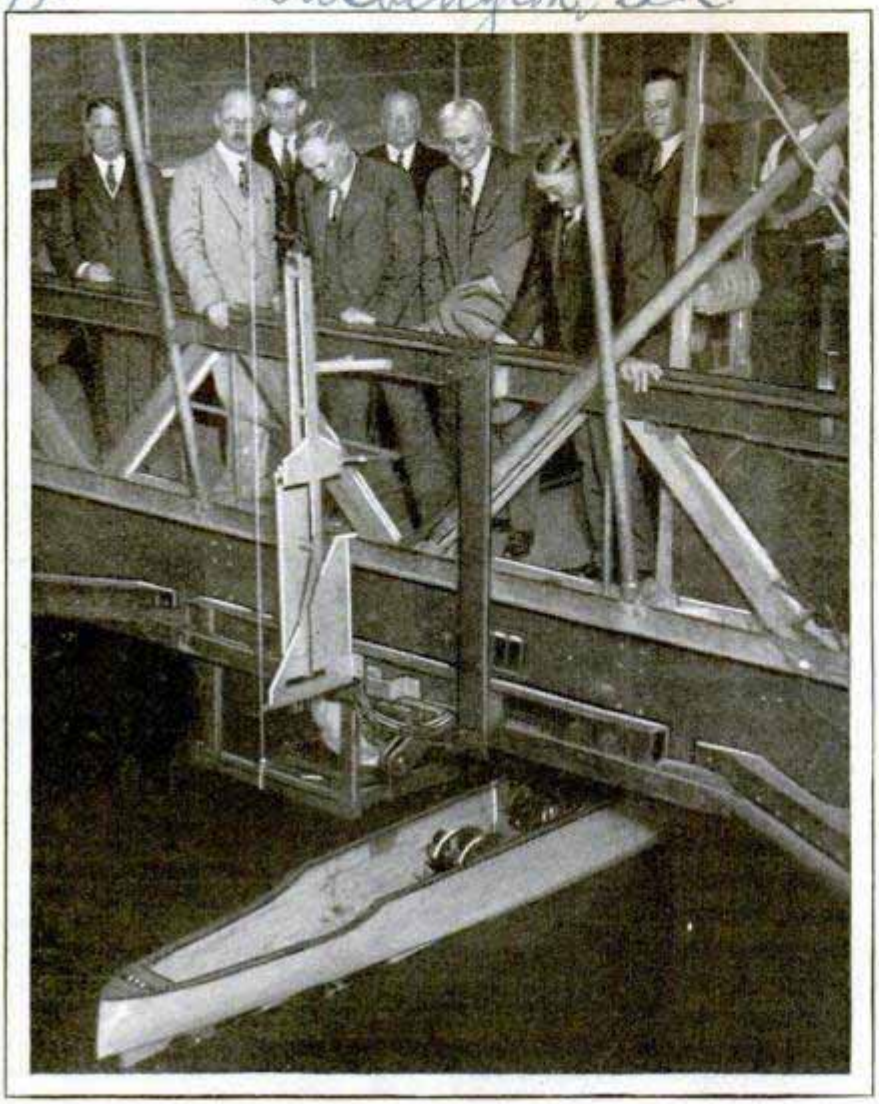


Officials Watching from the Crane Bridge as Model of Transatlantic Hull Is Tested in Towing Basin

FOUR-DAY ATLANTIC LINERS PROMISED BY TEST

3552

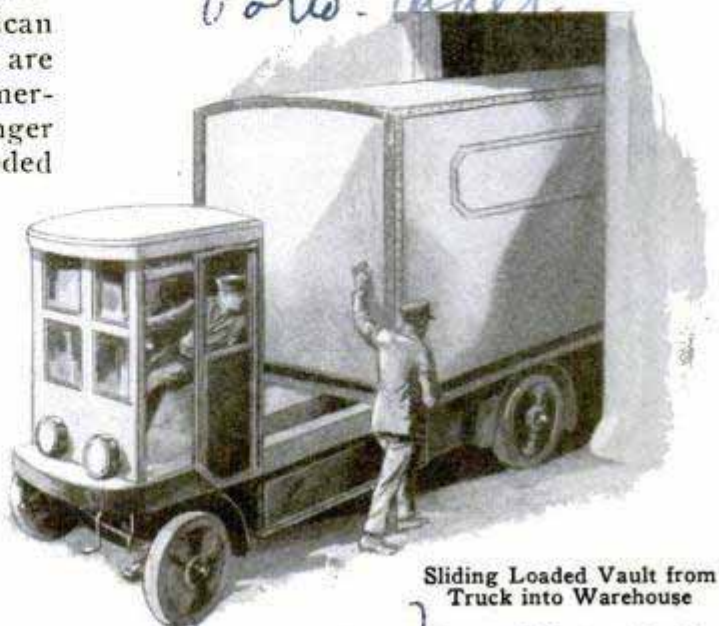
Keels for ten passenger liners, the fastest ever built, will be laid in American shipyards next spring, if present plans are carried out, as the first step to link America and Europe with four-day passenger service. Even that record may be speeded up in good weather by using airplanes to reach the ships hundreds of miles at sea, and to leave them at equal distances from the coast. Each vessel is to be provided with a landing deck for airplanes. Plans for the high-speed ships have been drawn, and the hull model already tested in the towing basin at the Washington navy yard. The ten ships will cost $150,000,000. The four-day service will be made possible by eliminating the tedious passage down New York bay and up the coast of Long Island, and by building the ships to operate at thirty-one-knot cruising speed and thirty-five-knot full speed. Instead of sailing from New York, it is planned to make New London, Conn., an ocean passenger port again. New London is only two and a quarter hours from Grand Central terminal by rail, but several hours away by water.

3366

FURNITURE VAULT SAVESHANDLING IN STORAGE

Furniture is stored in portable vaults under a plan recently introduced, saving repeated handling of the same piece and making it unnecessary to wrap each article as completely. The vault is carried on a motor truck, the goods loaded in, the vault sealed and then stored as a unit in the warehouse until the furniture is wanted. Each vault is fire and dustproof, has a separate lock and is moved about on wheels.

Porto-Vault



Sliding Loaded Vault from Truck into Warehouse

Day + Meyer-Murray + Young, Inc., 305 E 6[illegible] st.

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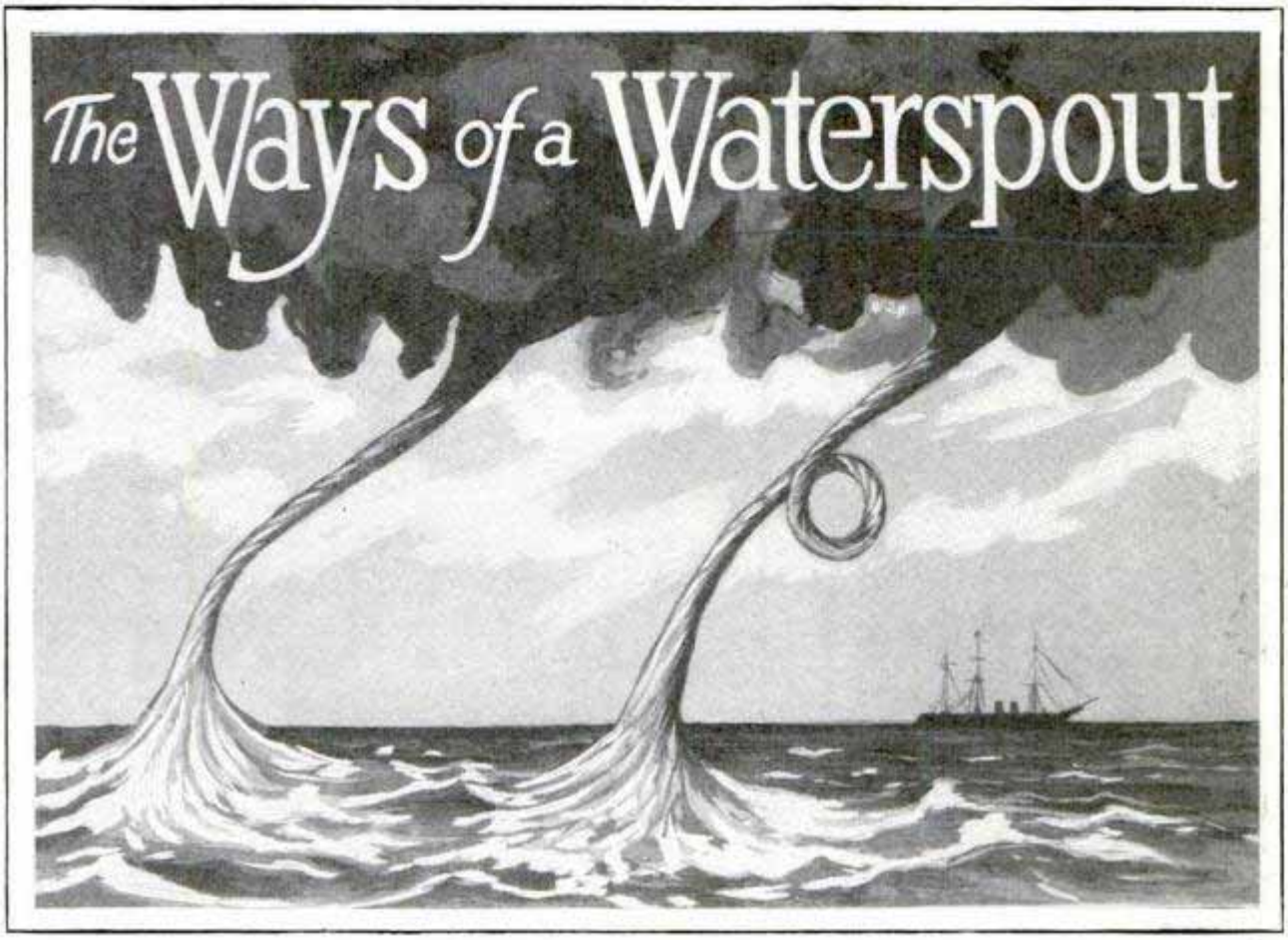
The Ways of a Waterspout



Pair of Twin Waterspouts, One of Which Tied a Knot in Itself, Observed off the Coast of New South Wales by Capt. Richard Taplin and Reported to the Royal Society

By CALVIN FRAZER, Box 840, Washington D.C.

A DANGLING funnel of vapor protrudes downward from the clouds. The water beneath, churned round in violent turmoil, hurls up a pyramid of spray. The two meet in a slender slate-gray column that advances majestically over the sea, spinning on its axis like a dancing dervish. Five minutes—ten minutes—and the frail shaft collapses in a momentary deluge of rain. Such is a waterspout.

Fascinating to watch at the safe distance of a mile or two, the waterspout, at close quarters, is a thing to terrify the stoutest heart. No mariner runs into one from choice. Records, showing that few vessels, except the smallest, have ever been seriously mishandled by these monsters, cease to be reassuring when the writhing colossus, half a mile high and scores of hundreds of feet in diameter, comes charging down on your ship. After all, the records tell only of the vessels that have survived.

Let us dismiss briefly the elementary facts about waterspouts. The visible column is only a cloud. It is no more a solid pillar of water than is the spout sent up by a "blowing" whale. In both cases invisible water vapor is condensed into liquid droplets by cooling. The whale's warm, moist breath is condensed by the chill of the atmosphere. The cloud of the waterspout marks the location of a swiftly revolving vortex, which, by flinging the air away around it, forms a partial vacuum. The rarefaction of the air causes "dynamic cooling." Hence the condensation of moisture. Most ordinary clouds are formed by the cooling of air that expands in rising.

The visible waterspout is exactly the same thing as the so-called "funnel-shaped cloud" of the tornado on land. There is no essential difference between waterspouts and tornadoes. It is a mere accident of language that makes most people think of them as entirely distinct phenomena. It is not uncommon for a tornado to form on land and then pass over water, becoming a waterspout. Or a

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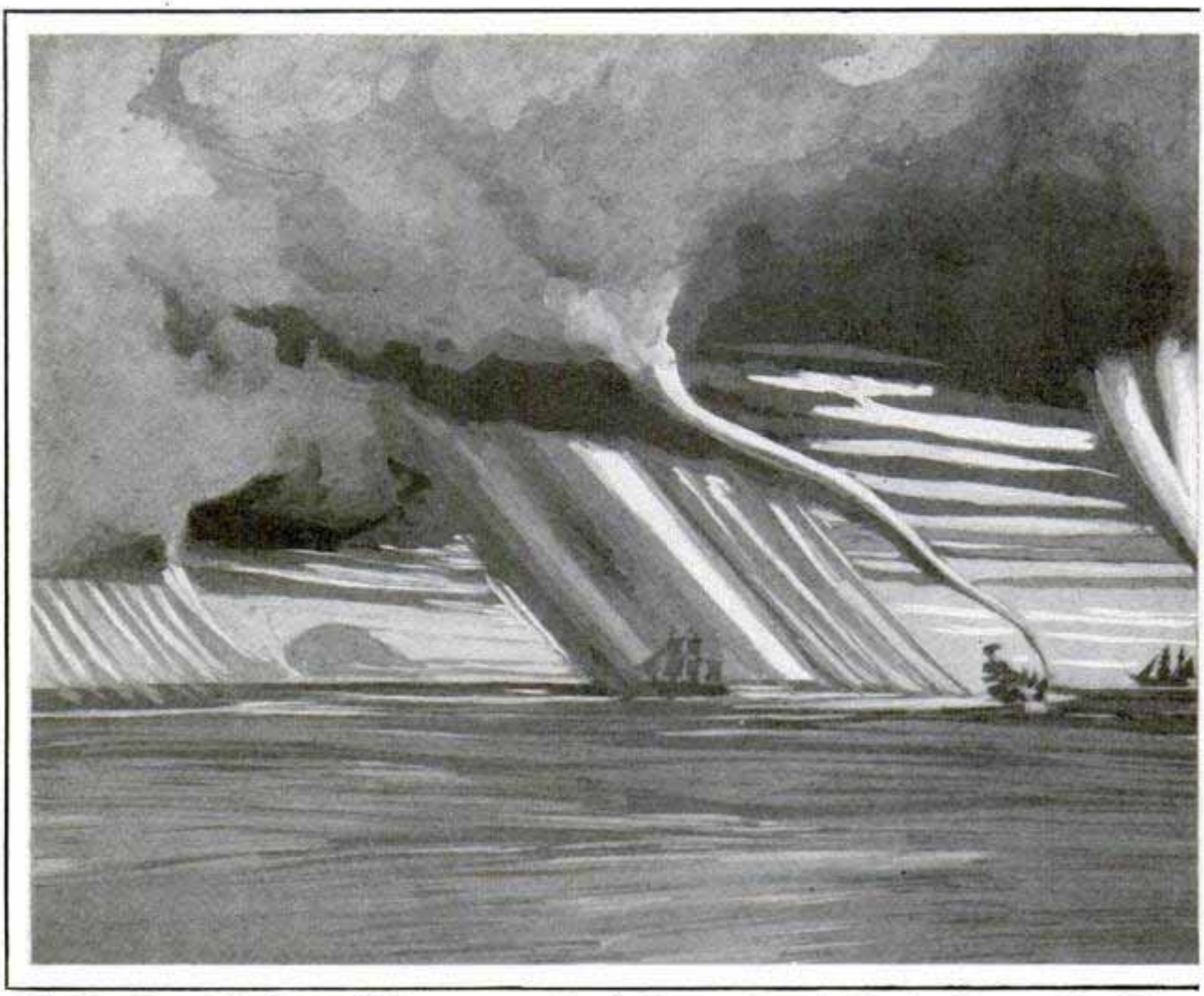


The Most Remarkable Group of Waterspouts on Record, Above, and on the Opposite Page, as They Were Sketched by an Eye Witness near Stromboli, on the Mediterranean, June 22, 1827

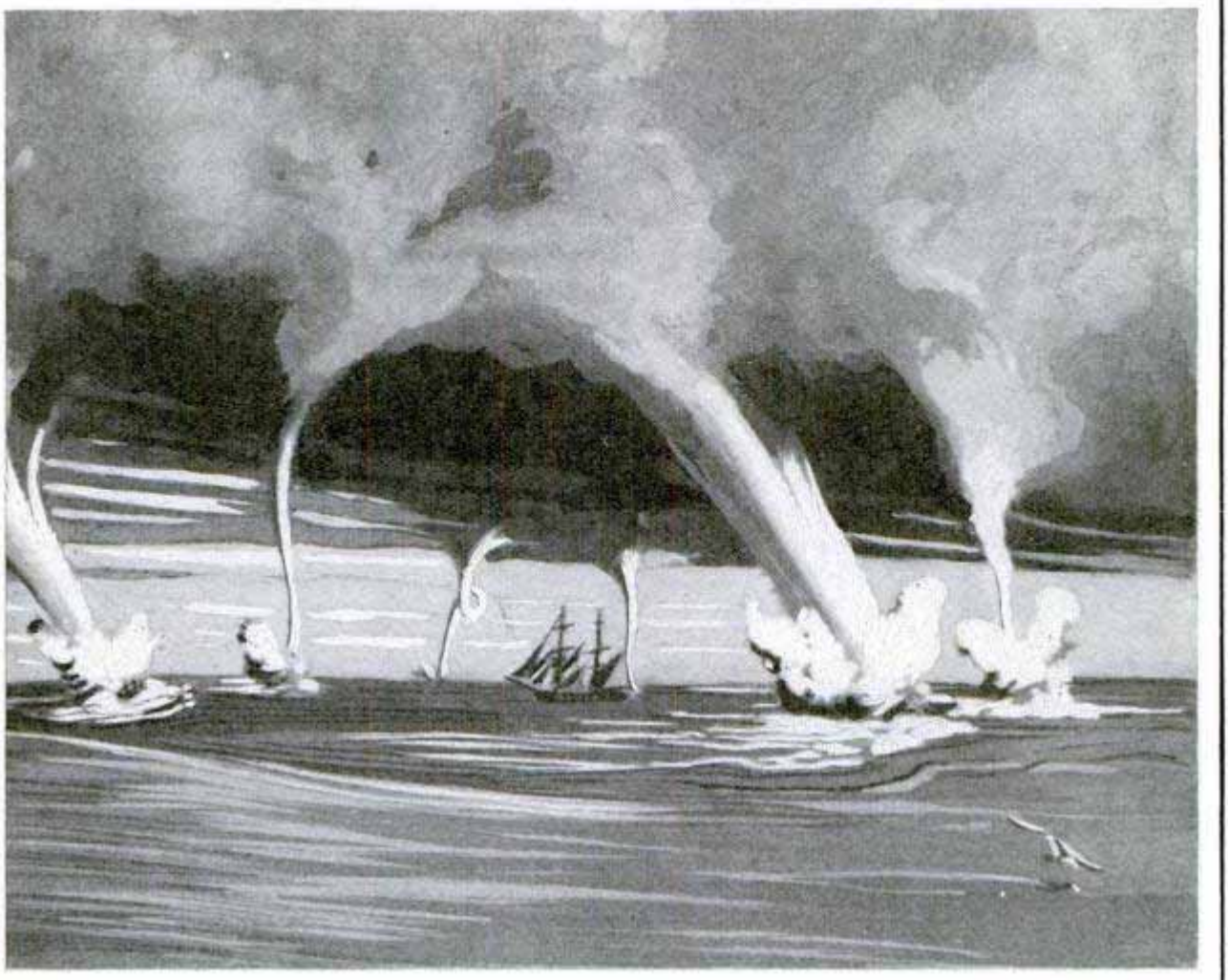
spout may form off shore and travel inland, uprooting trees, demolishing houses, and giving ample evidence of the fact that it is a full-fledged tornado.

Spouts, whether of land or water, are born in the clouds. They form aloft in the turbulent region between two streams of air flowing in different directions or at different velocities, especially when these streams differ markedly in temperature and humidity. Local whirls are set up at the boundary surface. Most of these die in the upper air, but some of them are so strongly developed that they work their way down to earth.

The trade-wind belt is a favorite breeding ground of waterspouts, which are formed by the conflict between the easterly trades and the westerly countertrades blowing above them. In our latitudes an elongated "trough" of low barometric pressure, with oppositely directed winds on either side of it, furnishes ideal conditions for the origin not only of waterspouts and tornadoes, but also of squalls and thunderstorms.

When a waterspout is forming, and while the cloud still dangles in mid-air, the water beneath is suddenly thrown into violent agitation. Often a saucerlike depression can be seen, around which is built up a mound of spray. This means that the aerial vortex has already pushed its way down to the water, though the visible column of vapor does not yet extend so far. Even in the fully developed spout, the vapor column is sometimes so thin that distant objects can be plainly seen through it.

The lifting powers of waterspouts have been exaggerated by some writers and underrated by others. There is a strong updraft of air in the core of the spout. It is undoubtedly sufficient, in a big waterspout, to suck up a considerable amount of sea water to a height of several hundred

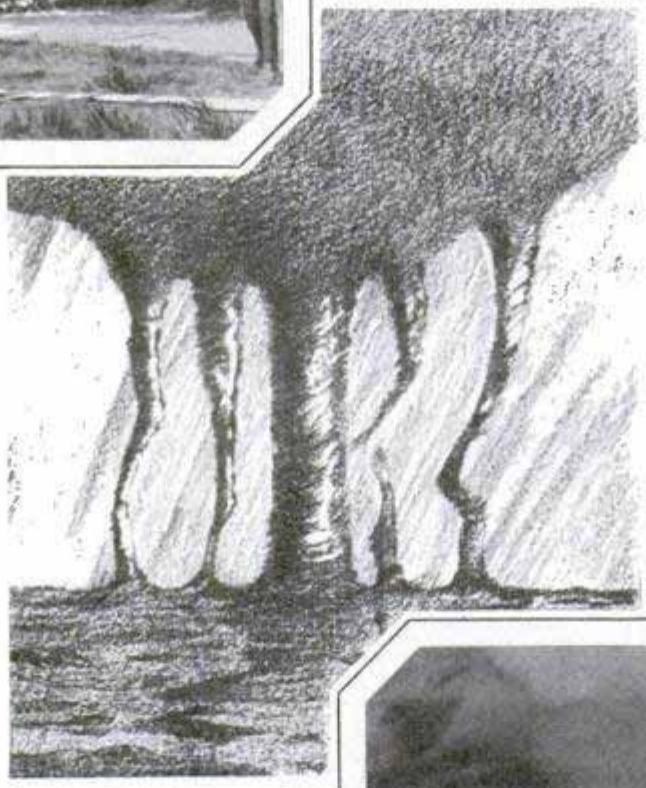


Caught in Such a Group of Whirling Towers of Thousands of Tons of Water, the Fate of Small Sailing Ships Was Problematical, Which Made the Spouts Feared by Mariners

feet. In fact, this water, thrown from the spout by centrifugal force, may often be seen forming a lofty cataract around the base of the column. Solid objects can also be carried aloft, just as they are in tornadoes. Whether a waterspout could carry up a small boat or a sailor, whisked from the deck of his ship, as tornadoes sometimes carry up the roofs of houses, wagons, cattle and human beings, is unknown. Apparently no such feats have ever been recorded.

Then there is another class of phenomena of somewhat similar appearance but quite different origin, to which the name waterspout is often misapplied. Occasionally, in calm weather, small whirlwinds will start from the surface of a body of water and build up columns of spray and vapor to a considerable height. They do not often extend up to the clouds and, in fact, they are sometimes seen with a perfectly clear sky overhead. They are similar in character to the little dust whirls that form over dry roads and the larger columns of dust and sand formed over deserts. On land, such whirls are due to the overheating of the ground and the formation of a layer of stagnant hot air at the surface, which suddenly breaks upward through a colder layer above it. A water surface does not heat up like a land surface, but it may remain warm while the air a few feet above it is rapidly cooled, giving the same unstable condition—warm, light air next to the water and cold, heavy air farther up. The whirls on land are made visible by the dust they carry, but in the moister air over water a cloud of vapor may be formed, as in the true waterspout.

It is not uncommon for waterspouts to appear in pairs or groups, and as many as twenty have been seen at one time. A very unusual case of multiple waterspouts was reported a few years ago to the Brit-



ish meteorological office by J. B. Hewitt, chief officer of the steamship "Carston." About five o'clock one afternoon, while near Guantanamo, Cuba, the ship ran into a severe thunderstorm. Hardly had this subsided when the clouds began sending down tapering arms on all sides of the vessel, and several of these formed complete waterspouts. Finally there were nine large spouts, perfectly formed, within a short distance of the ship. Then a curious sight was witnessed. Around some of these spouts two or three—and in one case, four—slender, weedy-looking spouts were formed. They not only traveled with the big spouts but at the same time circled slowly around them, like satellites revolving about a planet. Their movements were erratic; sometimes they approached the central spout, and sometimes receded from it, at the same time undulating with great violence.

In recent years many accurate measurements have been made of waterspouts, both from ships and from shore. On Dec. 28, 1919, a large waterspout was observed from the British steamship "War Hermit." Measurements with a sextant showed the distance between the base of the cloud and the surface of the sea to be 4,600 feet. The width of the column tapered from 500 feet at its junction with the cloud to 150 feet at the sea. Spray was thrown up to a height of more than 300 feet over an area 250 feet in diameter. In this case the observers reported the spout to consist of a central column inside a hollow tube. When the spout was breaking up, the central column appeared to be lifted as a whole into the clouds, while the walls of the outer tube dissipated into spray. This double structure of waterspout columns figures in several other descriptions, but has never been satisfactorily explained.

In ancient times waterspouts were believed to be living monsters—dragons of the deep. Long before the invention of gun-

A Waterspout over Land Is a Tornado; Freak Spouts near Guantanamo, Cuba, May 7, 1920, and Spout Photographed on Lake Winnipeg

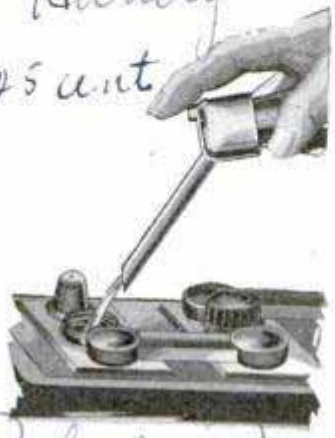
powder, several noise-making procedures were in use among sailors to keep these creatures at a distance. The mariners who sighted a spout would shout, stamp on the deck, beat drums and gongs, or clash their swords to frighten it away. When cannons were introduced, they provided an additional means of making a noise and were used for the same purpose then as well as later.

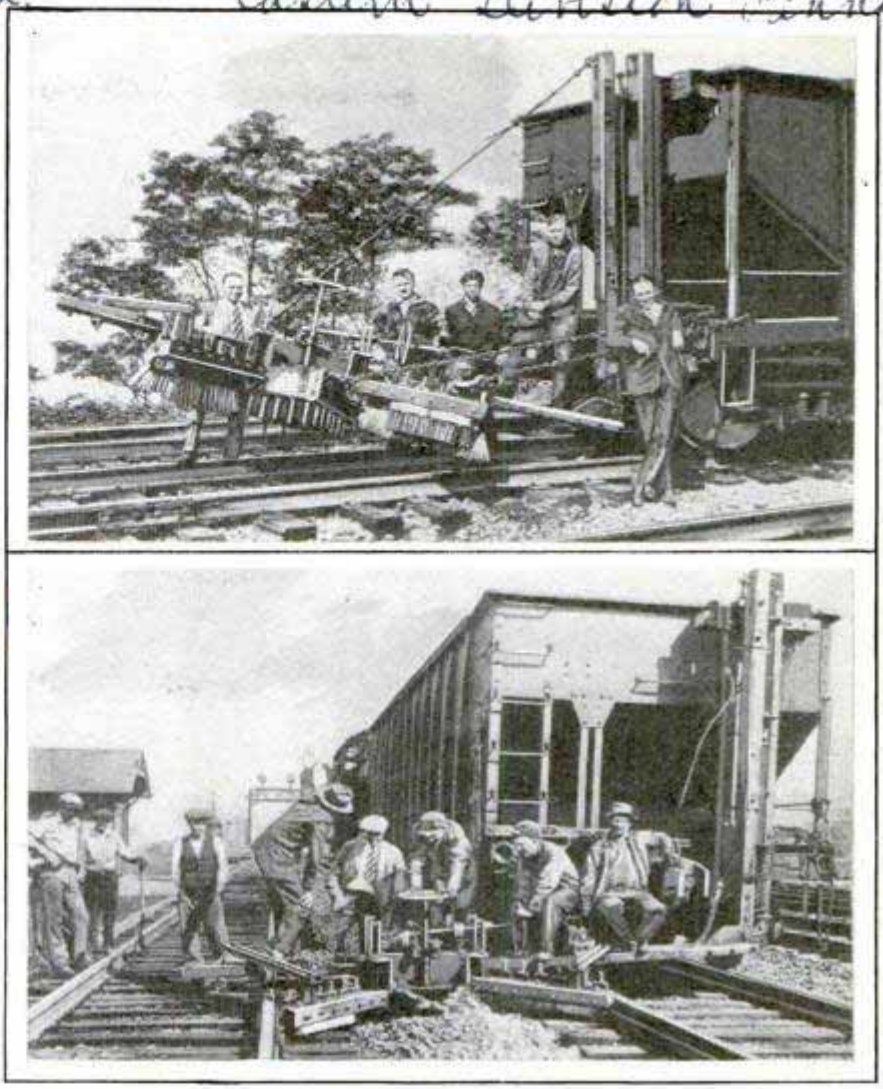
RADIOED MESSAGES TO BE SOLD BY THE INCH

Since typed or printed pages, checks and other documents can now be sent as a unit by wireless, a British authority predicts that charges in the future may be based on the square inch instead of by word or line. This method will be as common as to sell butter by the pound, he declares, and believes that great developments in speedier and more accurate radio are under way. Photographs, etc., sent by wireless between Great Britain and the United States have been charged for on a size basis.

BATTERY FILLER CAP PREVENTS SPILLING WATER

Designed to fit the top of any distilled-water bottle, a filler cap prevents spilling when supplying the storage battery. A tip is pressed by the fingers to stop the flow at any point. When this is released, the water pours out.



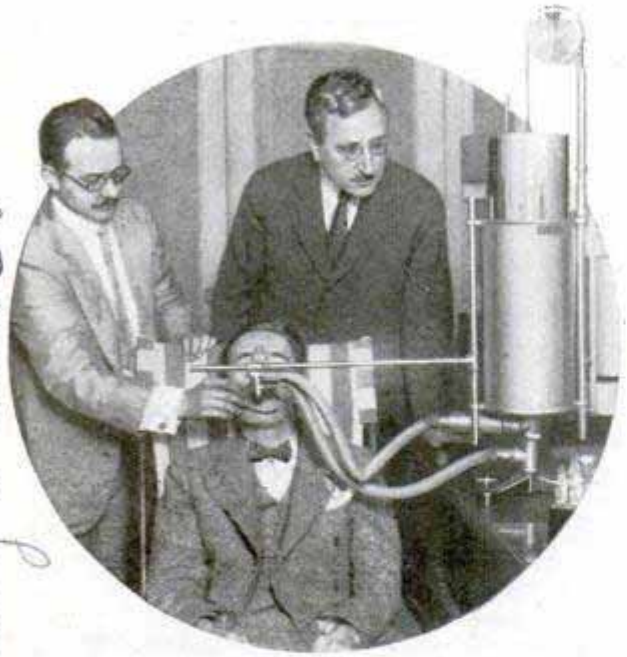


Ballast Spreader Devised by Foreman of the Pennsylvania Railroad; It Is Based on Principle of Farm Harrow

LEVEL BALLAST ON RAILROAD WITH TIMESAVING RIG

Railroad men have adapted the principle of a familiar farming implement to level ballast as it is dumped on the tracks for distribution between them and the ties. The unit is intended to replace the pick and shovel of the section gangs and is an application of the old-fashioned V-shaped soil harrow. It operates on a pivot so that it can be swung out of the way when trains pass and is attached to the hopper car that dumps the ballast. Flanged rollers, resting on the adjoining rail of the parallel track, help guide it and there is a series of sweepers, brooms and wire track brushes to clear the tops of the ties from the scattering pieces of ballast as the working gang advances.

¶Feeble magnetic properties have been noted in gases.



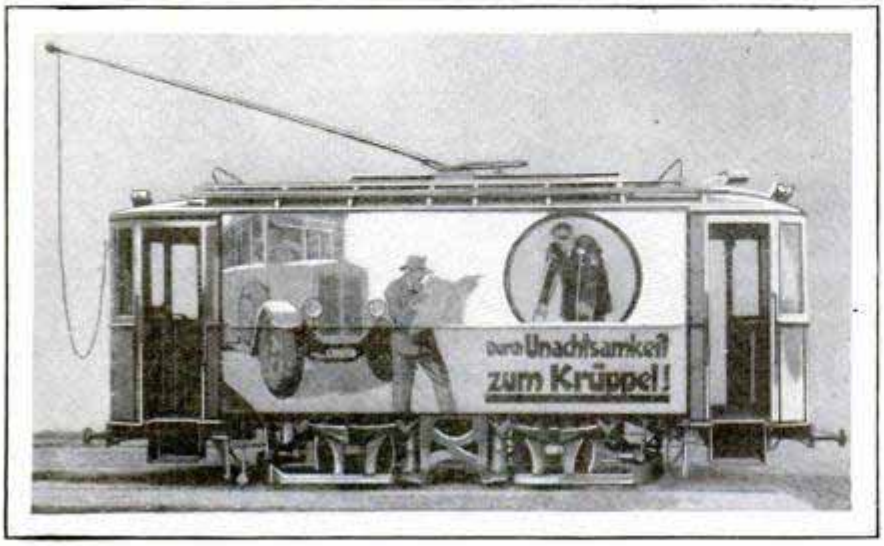
Measuring Oxygen Consumed by Patient in an Effort to Determine the Cause of Stammering

TRACE CAUSE OF STAMMERING WITH BREATHING GAUGE

University of Pennsylvania professors, after an extensive study of speech defects, report that one of the causes of stammering and other impediments, is low oxygen consumption. In making their tests, they employ a breathing gauge which shows how much oxygen the subject uses during normal respiration.

CARS SPREAD SAFETY MESSAGE WITH BIG PAINTINGS

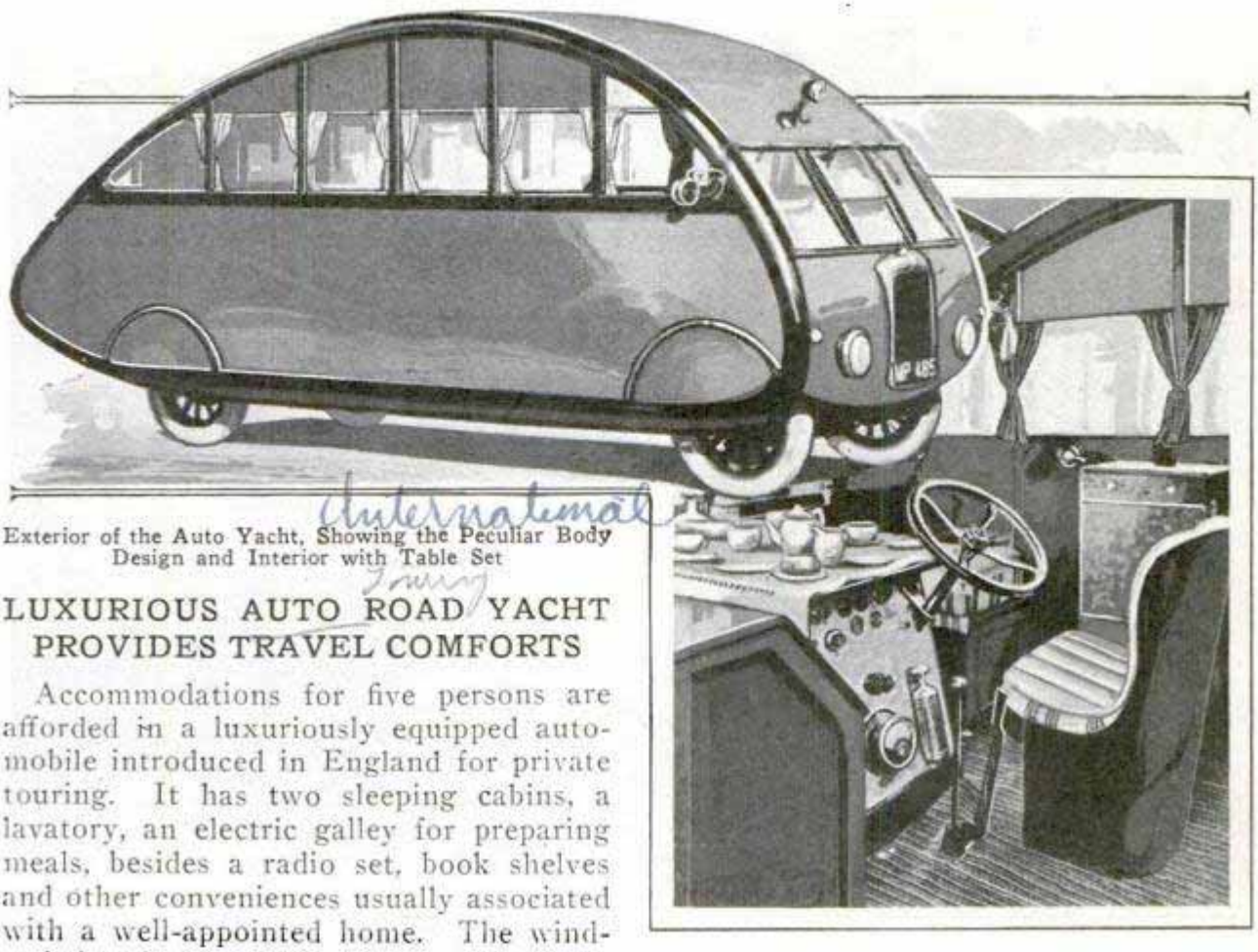
Life-sized paintings, illustrating some of the risks that pedestrians and others commonly take, are attached to the sides of the cars used for track and street-cleaning purposes on the surface lines in Breslau, Germany. The vivid posters can be seen from a considerable distance and, since the cars move slowly, their message is the more emphatically impressed.



Spreading Safety Propaganda with Street Cars; Poster on Side Warns Pedestrians of Dangerous Risks

PASSING TRAIN REPORTS SELF THROUGH RADIO "MIKE"

Using radio microphones so that distant trains can announce their passage to the dispatcher at headquarters is being tried out successfully on the Missouri-Kansas-Texas railroad. The automatic reporters take the place of telegraph operators in stations that are closed at night. A microphone is mounted in a box beside the track and the thunder of the approaching train is reproduced by a loud speaker at the dispatcher's office in a distant city—for some of the divisions are as much as 400 miles long. Three of the outfits, working automatically, are placed outside yard terminals to report to the dispatcher when a train that has been ordered is actually made up and clears the yards. Fifteen others are used to replace night telegraph operators along the line. When the dispatcher expects a train in the neighborhood of one of the microphones, he "cuts" the "mike" into his loud-speaking telephone line, in the same way as an ordinary telephone connection would be established. Then he goes about his other business until the rumble of the loud speaker announces the train is approaching. Speed can be calculated by counting the clicks of the wheels over the rail joints, and even the number of cars in the train accurately counted. If the freight stops to do any switching, the dispatcher hears it, and also hears the engineer's farewell whistle when he gets under way again. With that information it is possible to arrange passing connections and other details to be handed down at the points along the road where all-night order operators are on duty.



Exterior of the Auto Yacht, Showing the Peculiar Body Design and Interior with Table Set

LUXURIOUS AUTO ROAD YACHT PROVIDES TRAVEL COMFORTS

Accommodations for five persons are afforded in a luxuriously equipped automobile introduced in England for private touring. It has two sleeping cabins, a lavatory, an electric galley for preparing meals, besides a radio set, book shelves and other conveniences usually associated with a well-appointed home. The wind-resisting design of the body is an interesting feature of the outfit, and the car can develop a speed of forty-five miles an hour.

MOVING WINDOW DISPLAY RUN BY LIGHT-SOCKET MOTOR

Moving effects are produced for the show window with a motor operated by a lighting circuit. It runs at slow speed and with little expense. There are few parts and the motor requires practically no attention after it has been installed. The hookup with the devices that are to be moved, is accomplished by a small pulley on one end of the motor shaft and an eccentric on the other. Connection between the display and the motor is made with a fine linen string or thread. When this is the color of the background, it is hardly visible so that the articles appear to move by some mysterious means. Dancing dolls, cutting scissors, and moving fountain pens are a few of the displays that are made possible by this simple unit.

MOISTENER TO WET STAMPS HELPS GUARD HEALTH

For convenience and greater cleanliness, a moistener to wet stamps and envelope tabs is worn on the finger like a thimble and supplies sufficient liquid for the work through a sponge at the end of a small reservoir. A valve keeps superfluous water from dripping through. The unit is made of material that will not rust or break, and stands upright on the desk or table.

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Digging for Diamonds

The Famous Jagersfontein "Excelsior" Diamond as It Appeared When Found; the Span of the Fingers Clasping It Gives a Good Idea of the Enormous Size of the Uncut Stone

By RENE BACHE, 1823 Q St Washington, D C

THE cost of producing diamonds in South Africa is $12 a carat. So says a recent report made to its stockholders by the Diamond syndicate, which controls the entire supply.

A cut diamond of one carat, bought at a jeweler's shop, costs $300 to $500, according to quality. The price, however, ascends in a sort of geometrical progression with increase in size, so that a fairly large stone is worth a fortune.

The South African mines controlled by the syndicate yield ninety-six per cent of all the diamonds produced in the world. In effect, it is a monopoly. If they put on the market all the diamonds they are able to produce, the stones would be comparatively cheap. But the price is kept high by limiting the output and the number permitted to be sold.

There was, in 1870, a farm, about 600 miles north of Capetown near the Vaal river, which was called Dutoit's Pan, because of a curious circular depression that covered several acres of the land. The Boer farmer's humble dwelling was plastered with clay. His children, playing about, noticed some small glittering pebbles in the plaster, and picked them out. They proved to be diamonds. When that fact had been ascertained, the farmer proceeded to dig in the place where the clay had been obtained, which was inside the rim of the above-mentioned depression, and more of the gems were turned up by his pick and spade.

As now known, the circular depression was the mouth of a volcanic pipe which led down into the bowels of the earth. In an earlier age, when all that country was probably under water, the pipe was filled up with volcanic mud which contained diamonds crystallized by enormous heat out of rocky material rich in carbon.

Today, in the place of the circular depression, there is a monstrous hole, nineteen acres in surface extent and nearly a quarter of a mile deep. It is the great Dutoitspan diamond mine, its enormous shaft following the volcanic pipe downward into the ground.

Presumably the pebbles found in the

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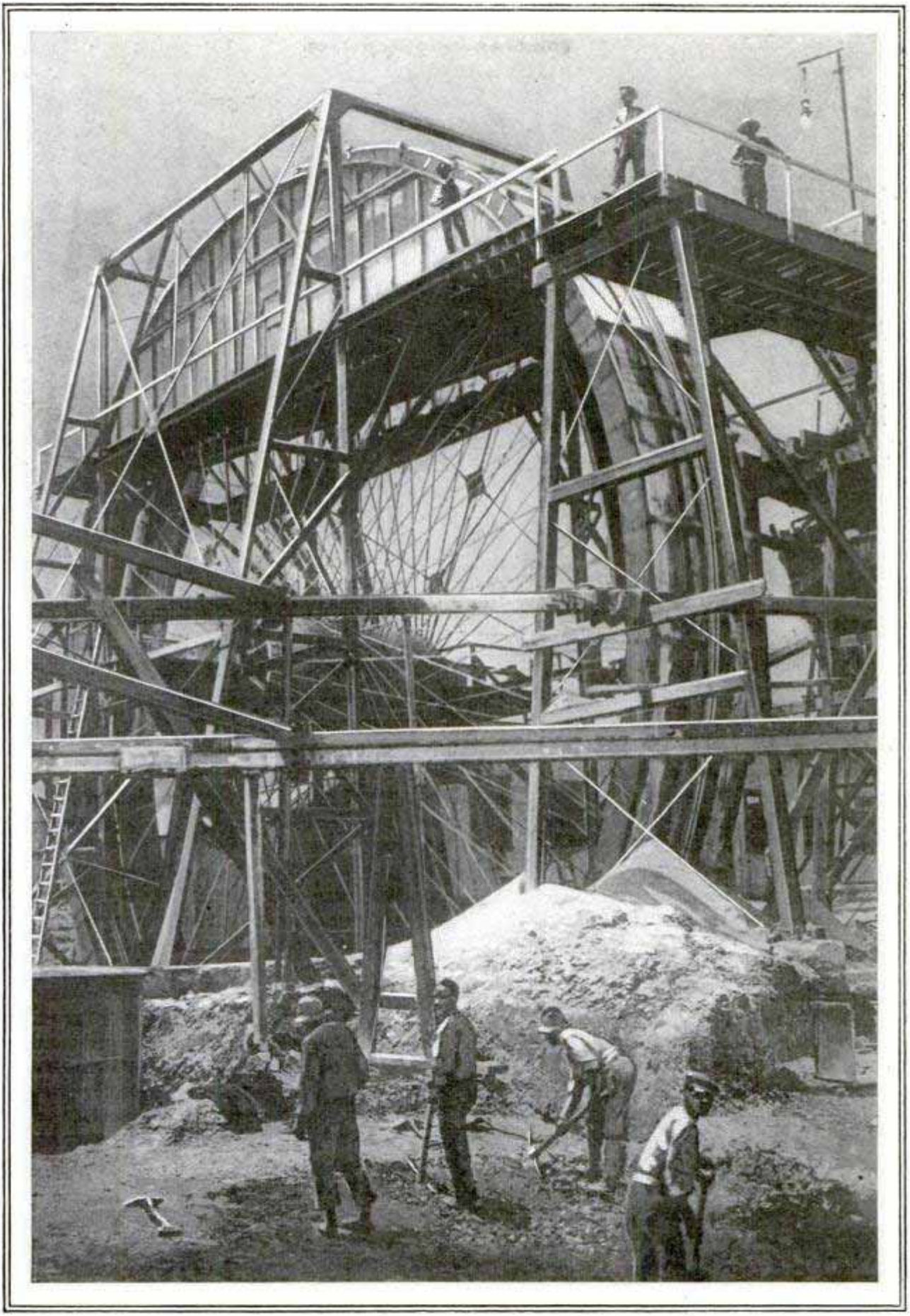

Gold and Platinum Have Become as Important in South Africa as the Diamond Fields; This Huge Wheel Carries the Powdered Gold Ore Up to Be Dumped in the Cyanide Separation Tanks

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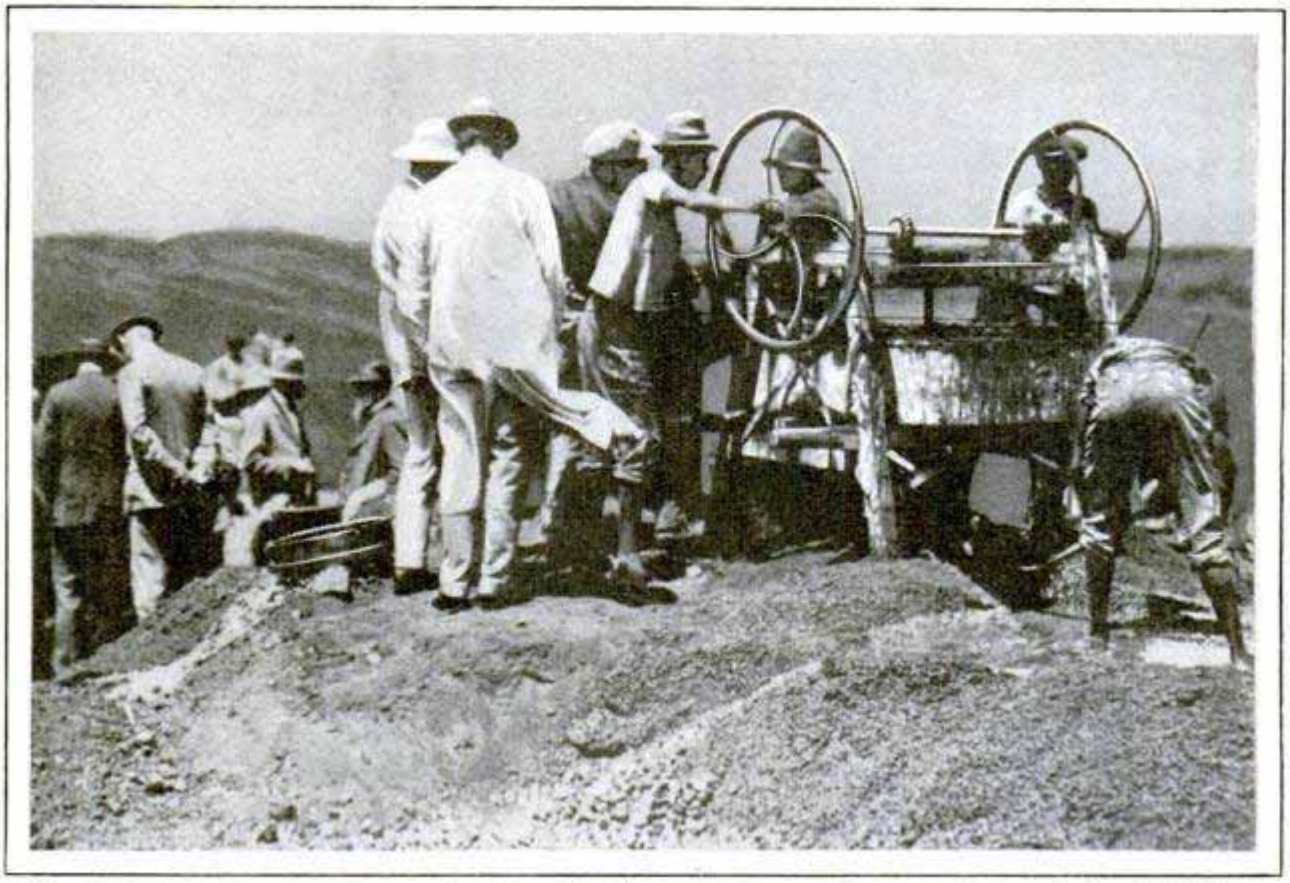


The "Baby" Washing Machine Cleaning Gravel in Search of Diamonds beside a Stream Bed at Mafeking; Diamond Mining Is Much Simpler Than Taking Minerals from Ore

clay plastering of the Boer farmer's house would have attracted no particular attention save for the fact that already much excitement had been caused in that region by the discovery of many valuable diamonds in the gravels of the Vaal and Gong-Gong rivers.

The first discovery of the kind, purely accidental, owed its occurrence to a child. In 1867, an Irishman, John O'Reilly, on a hunting trip south of the Orange river, stopped for a night at the house of a Boer named Van Neikirk. The Boer's little daughter was playing with some bright pebbles on the floor, and O'Reilly asked if he might have one of them. He picked out the biggest one, which he afterward sold at Capetown for $1,000, a small fraction of its real value.

Two years later, a Dutch trader in that region learned that a certain Kafir witch-doctor had in his possession what was supposed to be a magnificent diamond of great size. He sought to purchase the stone, offering a span of oxen for it, but the dealer in magic and spells valued it highly as a charm of special potency and refused to sell. The trader added to his offer his tent wagon and appurtenances, and finally, stripped of all his belongings save gun and ammunition, he departed with the gem. It weighed eighty-three and a half carats, and eventually passed into the hands of the Earl of Dudley, who paid $125,000 for it. This diamond is known as the "Star of South Africa."

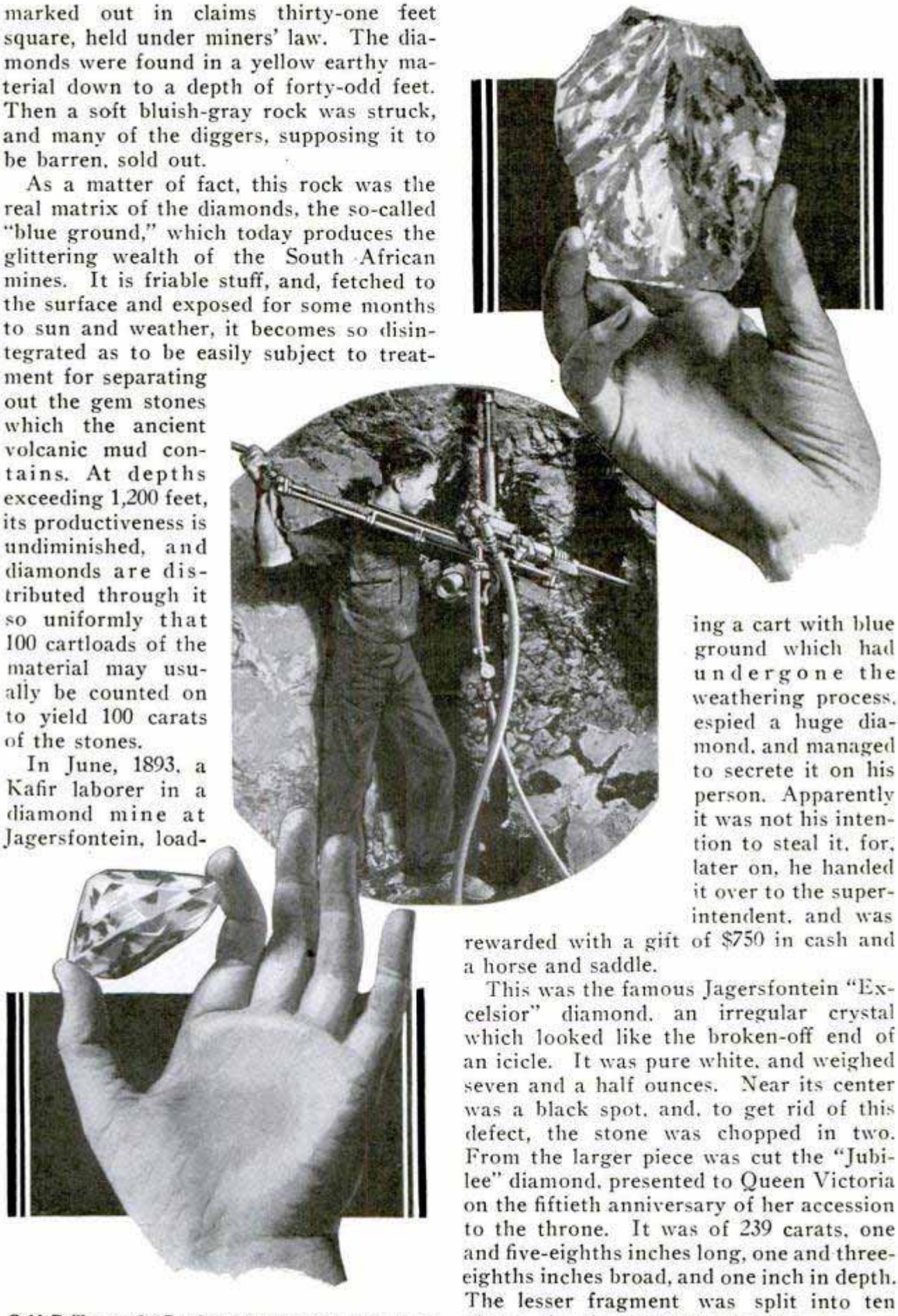
The diamonds found in the river gravels had evidently been washed out of rocks somewhere, but it was not until 1870 that one of the sources from which they originally came was discovered on the Dutoit's Pan farm. There were other sources, for the volcanic pipe there located was not the only one. There were a number of such pipes in the same district, known as Griqualand West, which is now a part of Cape Colony. One of them is marked today by the great De Beers diamond mine, the mouth of which has a surface extent of thirty-five acres. The principal center of the diamond-mining industry is Kimberley, a city of 400,000 inhabitants.

No sooner did the Dutoit's Pan discovery become known than a rush to the scene began, and the Boer farmer found his land occupied by diggers who paid no attention to his efforts to warn them off. The whole diamond-producing area was

marked out in claims thirty-one feet square, held under miners' law. The diamonds were found in a yellow earthy material down to a depth of forty-odd feet. Then a soft bluish-gray rock was struck, and many of the diggers, supposing it to be barren, sold out.

As a matter of fact, this rock was the real matrix of the diamonds, the so-called "blue ground," which today produces the glittering wealth of the South African mines. It is friable stuff, and, fetched to the surface and exposed for some months to sun and weather, it becomes so disintegrated as to be easily subject to treatment for separating out the gem stones which the ancient volcanic mud contains. At depths exceeding 1,200 feet, its productiveness is undiminished, and diamonds are distributed through it so uniformly that 100 cartloads of the material may usually be counted on to yield 100 carats of the stones.

In June, 1893, a Kafir laborer in a diamond mine at Jagersfontein, loading a cart with blue ground which had undergone the weathering process, espied a huge diamond, and managed to secrete it on his person. Apparently it was not his intention to steal it, for, later on, he handed it over to the superintendent, and was rewarded with a gift of $750 in cash and a horse and saddle.



Gold Driller on the Rand and Two Famous Stones, the "Cullinan," Top, Largest Ever Found, and the "Jubilee," Cut from the "Excelsior"

This was the famous Jagersfontein "Excelsior" diamond, an irregular crystal which looked like the broken-off end of an icicle. It was pure white, and weighed seven and a half ounces. Near its center was a black spot, and, to get rid of this defect, the stone was chopped in two. From the larger piece was cut the "Jubilee" diamond, presented to Queen Victoria on the fiftieth anniversary of her accession to the throne. It was of 239 carats, one and five-eighths inches long, one and three-eighths inches broad, and one inch in depth. The lesser fragment was split into ten pieces, the three largest yielding gems—a "pear," a "drop," and a "marquise"—weigh-

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ing 158, 147 and 130 carats, respectively.

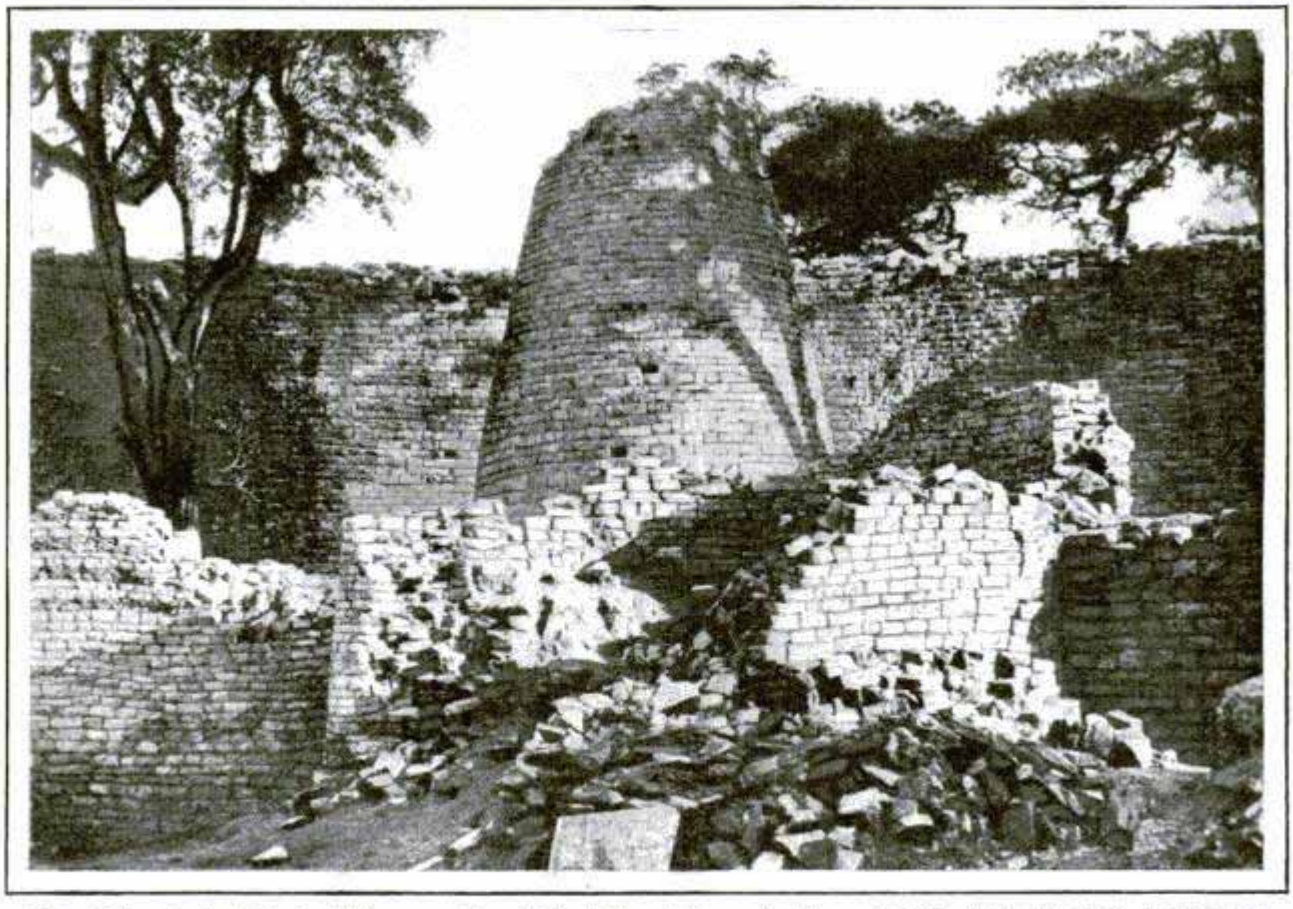
The idea of chopping up a diamond was entirely new, a thing previously unheard of. But something much more remarkable in that line was destined before long to follow, in connection with a stone so gigantic that its weight was reckoned in terms of pounds! That stone was the "Cullinan," by far the largest diamond ever known, which came from the Premier mine, in the Transvaal.

The manager of the mine, Fred Wells, was strolling idly about when he caught sight of a great white stone lying in the blue ground which was spread over a wide area to weather. It was four and a quarter inches long, two and a half inches broad, and one and a half inches thick; it resembled a piece of very transparent glittering ice, and weighed nineteen ounces. It was too large to be marketable. According to the rule for reckoning value in relation to size, it was worth about $45,000,000. The problem of its disposal was solved by presenting it to King Edward VII on his sixty-sixth birthday, as a gift from the South African government. To get rid of two flaws, it was split into several pieces, the object sought being to obtain from it a single cut stone of largest possible size and absolute perfection, the lesser fragments yielding gems big enough to be of high value.

The principal stone, when cut, was a pear-shaped drop-brilliant of 516½ carats, valued at $2,500,000. From the next-biggest piece was obtained a square brilliant of 310 carats, itself much larger than any cut diamond previously in existence, and weighing seventy-one carats more than the "Jubilee." Other fragments yielded six very big gems and sixteen smaller ones.

No fictional tales of wealth discovery can approach in romantic interest the true story of South Africa. For there is also the land of gold. During many recent years it has been pouring out a continuous flood of gold, a greater quantity annually than the entire world's production of that precious metal up to the time of the development of the mines of the Witwatersrand, in the Transvaal.

When the Queen of Sheba made her historic visit to King Solomon, she brought with her, for a gift to that monarch, nearly half a ton of gold. She was an Arabian



One of the Ancient Conical Towers at the Fabled King Solomon's Mines; Much of the Precious Stones and Metals of Biblical Days Presumably Came from Southern African Fields

queen, and her little kingdom, occupying the southwestern part of that peninsula, had for its principal seaport Aden, which was a transit point for all the sea-borne commerce that passed into and out of the Red sea. The gold fetched to Jerusalem by the queen came from South Africa—to speak more exactly, from southern Rhodesia, where her people and their neighbors, the Himyarites, had operated productive mines for several centuries. The scene of those operations is marked today by the ruins of what was manifestly a large and populous town, covering several square miles. In the middle of it, an isolated granite "kopje," 250 feet high, was crowned by a fortress built of hewn stone. It was an impregnable stronghold, protected on one side by a sheer precipice, ninety feet in height, while its inner defenses were guarded by a maze of labyrinthine passages so narrow that attackers would have been obliged to pass through them in single file.

The ruins include a great temple and conical towers of hewn stone, the latter presumably the "high places" (such as the Bible speaks of), to the tops of which the priests ascended to offer sacrifices. But much more interesting are the remains of extensive workshops for handling the gold brought in from the mines. Some of the furnaces used for melting it are still in position. Also there are crucibles and molds for casting gold bars. A number of gold ingots were found in the shops, and, in the temple, a considerable quantity of raw gold dust.

Solomon was born about 1000 B. C. Participation of the Israelites in the South African mining operations does not seem to have continued long after his death, for it was brought to an end by the destruction of their fleet and dockyards at Ezion-Geber, 900 B. C. But, within the last few years, the quartz reefs of that same area have been attacked by modern engineering methods, and the mines now yield more gold than California.

For New Notes in Jazz Music; the Elongated Banjo That Is Said to Produce Softer Tones

LONG-BODIED BANJO PRODUCES SWEETER JAZZ TONES

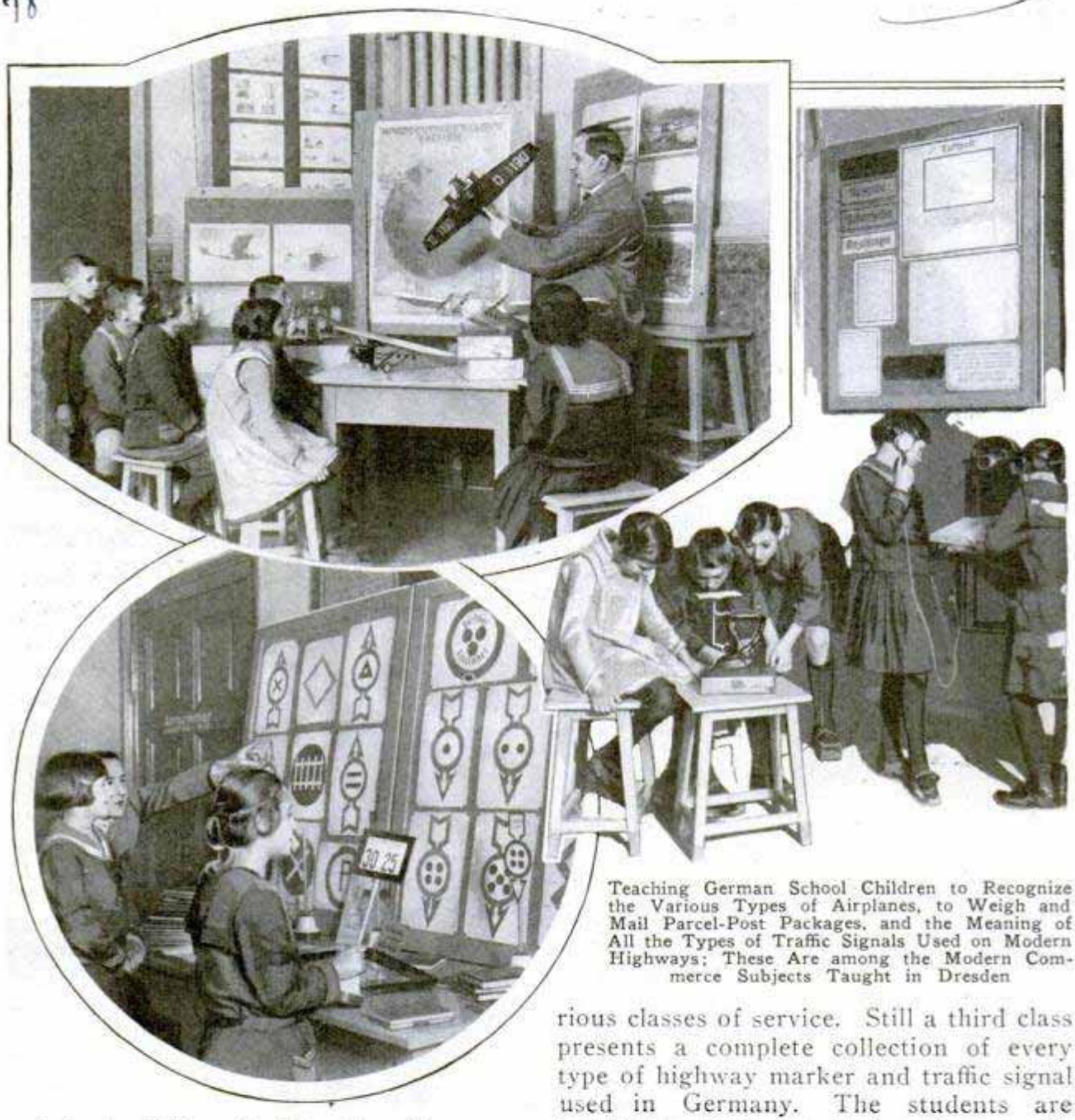
With a body about a yard long, a banjo-like instrument, invented by an eastern musician, is said to produce tones of a softer and sweeter quality than other stringed units, and is especially suited for jazz orchestras. It has four strings.

CHECKERS PLAYED WITH POLES LATEST OUTDOOR SPORT

One of the games popular at summer resorts in Great Britain this season was checkers played on a large "board" with felt pieces, three inches thick. They were moved about with the aid of poles inserted in loops at the top.

Fishpole Checkers, One of the Latest Outdoor Amusements at Summer Resorts in Great Britain; the "Men" Are Felt Disks

MODERN LIFE BRINGS NEW LESSONS TO THE SCHOOL



Teaching German School Children to Recognize the Various Types of Airplanes, to Weigh and Mail Parcel-Post Packages, and the Meaning of All the Types of Traffic Signals Used on Modern Highways; These Are among the Modern Commerce Subjects Taught in Dresden

School children in Dresden, Germany, receive special courses of instruction to prepare them for such modern things as flying, parcel-post rates and obeying a multitude of traffic signals when they become automobile drivers. In one class, models of all types of airplanes are used to impress their features, so that the student may recognize a plane in flight. Interest is added to the subject by having the pupils build model planes of their own. Another class is devoted to the use of the mails, with special attention given such subjects as weighing letters and parcels and computing the correct postage for various classes of service. Still a third class presents a complete collection of every type of highway marker and traffic signal used in Germany. The students are taught to recognize each and name its purpose, and then, on highways laid out on the floor, stage imaginary traffic problems and work out the correct solutions. By the time the pupils are large enough to operate automobiles, they will be thoroughly grounded in traffic rules, and, as pedestrians, they will run less danger of being injured.

¶Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

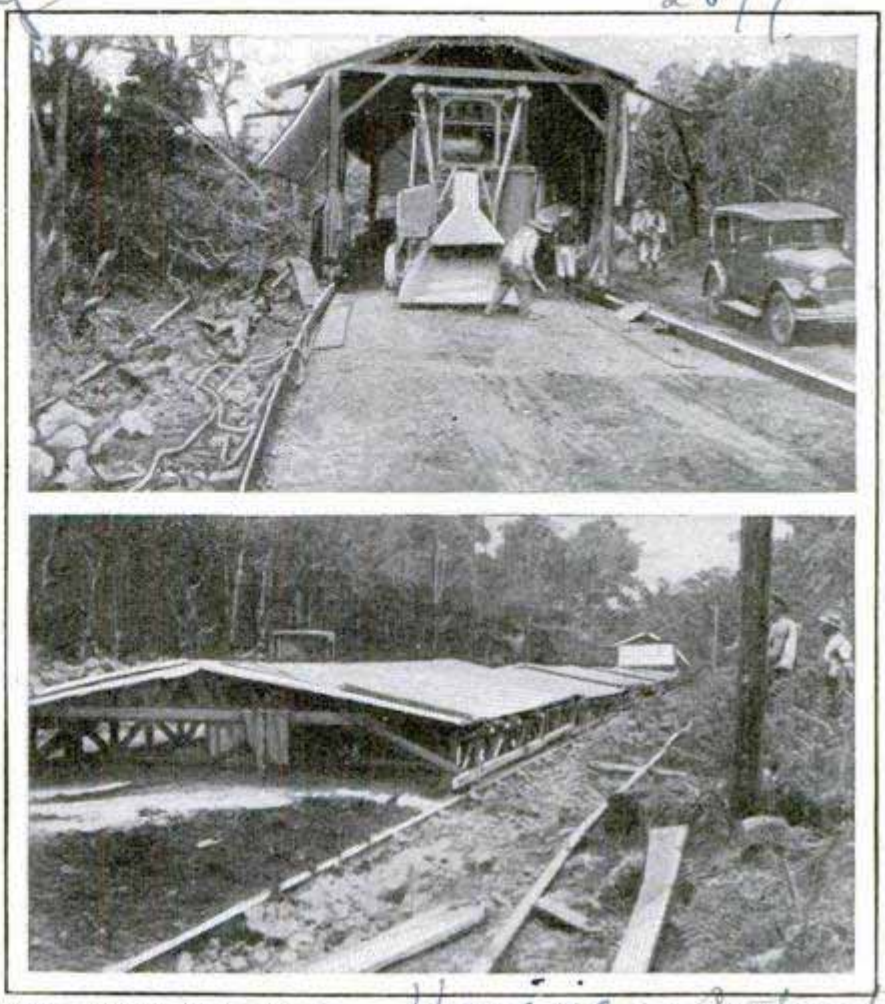
NEW AID FOR AIR NAVIGATION

Determining the position of an airplane while in flight without the necessity of elaborate mathematical calculations is now said to be possible with the aid of a sextant devised especially for aviators. It functions in a manner similar to that of the instrument used on ships, and the observer's position may be read directly from the sextant without any further work.

LIGHTS ON BUMPER FOR SAFE DRIVING

Heavy-duty automobile bumpers with lights on each side, have been introduced for greater safety and convenience in driving at night or in foggy weather. The lights are equipped with special lenses that make them efficient under difficult conditions. A broad beam of light, sent below the fog, illuminates the road for a considerable distance ahead. The rays penetrate the less dense mist at this level while the usual headlights cannot overcome the fog higher up.

Lights That Help in Driving through Fog Are Installed in Bumper



Courtesy Christian Science Monitor

Laying the Concrete Road, and Portion Covered with the Portable Roofs, to Protect Surface from Hard Rains

PORTABLE ROOFS FOR ROADS PROTECT FRESH CONCRETE

In the Hawaiian islands, where the rainfall is heavy, considerable difficulty has been experienced in building cement roads. To keep the fresh cement from being flooded or washed away, portable coverings have been devised. They are mounted on wheels and the canvas stretched tightly over wooden frames, shielding the concrete until it has set sufficiently.

ENDLESS BELT IN RESTAURANT SAVES WAITERS WALKING

To expedite service, and save the waiters needless steps, an endless-belt carrier has been installed in an eastern restaurant to convey food from the kitchen. Dishes are ordered by number from the menu, a button being pressed to signal for that particular article. The chefs place the platters on the belt which carries them in to the waiters in the dining room.

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Unveiling the

A "Miracle" by Compressed Air, One of the Tricks Used by the Egyptian Priests to Impress the Faithful by Causing Temple Doors to Open Mysteriously When the Fire Was Lighted

By W. T. HAROLD

IS there any truth in the weird stories of magic and spirit-raising performed by pagan and mediæval necromancers, and handed down in the works of classical authors?

This question is likely to suggest itself to many Americans when they recall the collection of 5,147 volumes and very rare manuscripts which the late magician, Harry Houdini, collected from all over the world and bequeathed to the library of congress, where they are now installed.

One night, about 350 years ago, a Florentine goldsmith, Benvenuto Cellini, accompanied by a necromancer, went to the ruins of the Colosseum at Rome. The necromancer said he wished to find a cache of buried treasure, but Cellini merely was curious to witness a seance in which the powers of darkness and the black art were to be invoked. The necromancer, using drugs and burning incense, apparently called forth hosts of demons, goblins and giants. Cellini was convinced that the manifestations were real.

"Oh," says our more skeptical age, "their imaginations were so wrought upon by the magic ceremonial and the unearthly surroundings in those ancient ruins, that they fancied they saw hosts of specters." But this is not quite the explanation of the strange affair.

Benvenuto Cellini was the victim of one of those phantasmagorias kept profoundly secret by the ancient Egyptian priests, which were mainly based on chemistry, acoustics, hypnotism, magnetism, optics, hydraulics and the creation of stage machinery to produce illusions. The famous colossal statue of Memnon, near Thebes, gave out a sound like the breaking of a harp string when the sunlight fell on it at dawn. Even today, there is still a mystery about the cause of this sound. Some classical authors say that at one time the statue greeted the dawn with a human voice. One theory of the origin of Memnon's dawn sounds is that when the solar rays fell on the mouth of the statue, they expanded concealed metallic rods, which

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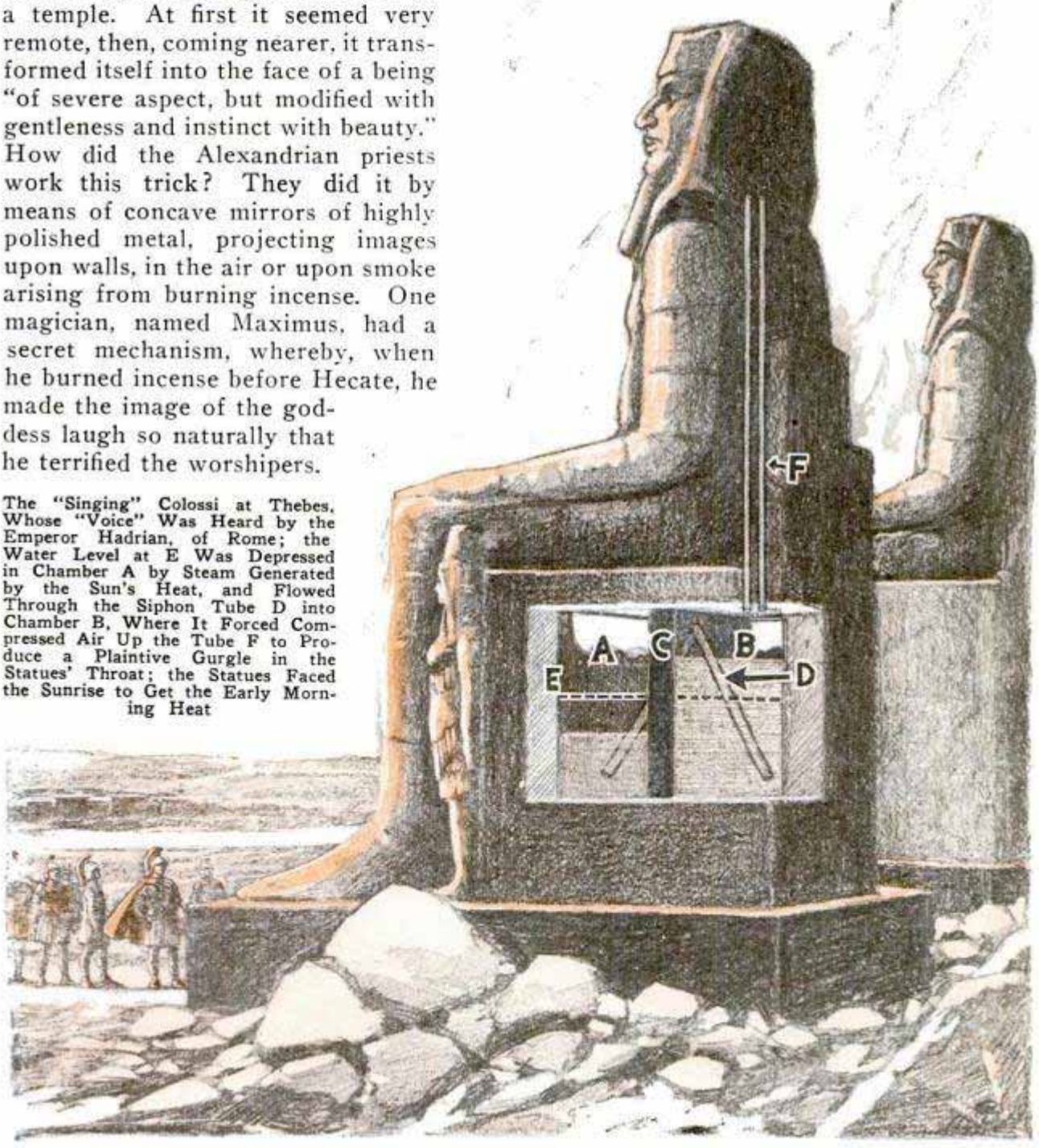
Mysteries of Pagan Magic

acted on a keyboard and gave out the notes.

The keepers of the ancient temples of the Pharaohs could rival the modern movie man in creating startling close-ups. Damascius, a Greek philosopher, was awed by a mysterious mass of light shining on the wall of a temple. At first it seemed very remote, then, coming nearer, it transformed itself into the face of a being "of severe aspect, but modified with gentleness and instinct with beauty." How did the Alexandrian priests work this trick? They did it by means of concave mirrors of highly polished metal, projecting images upon walls, in the air or upon smoke arising from burning incense. One magician, named Maximus, had a secret mechanism, whereby, when he burned incense before Hecate, he made the image of the goddess laugh so naturally that he terrified the worshipers.



The "Singing" Colossi at Thebes, Whose "Voice" Was Heard by the Emperor Hadrian, of Rome; the Water Level at E Was Depressed in Chamber A by Steam Generated by the Sun's Heat, and Flowed Through the Siphon Tube D into Chamber B, Where It Forced Compressed Air Up the Tube F to Produce a Plaintive Gurgle in the Statues' Throat; the Statues Faced the Sunrise to Get the Early Morning Heat

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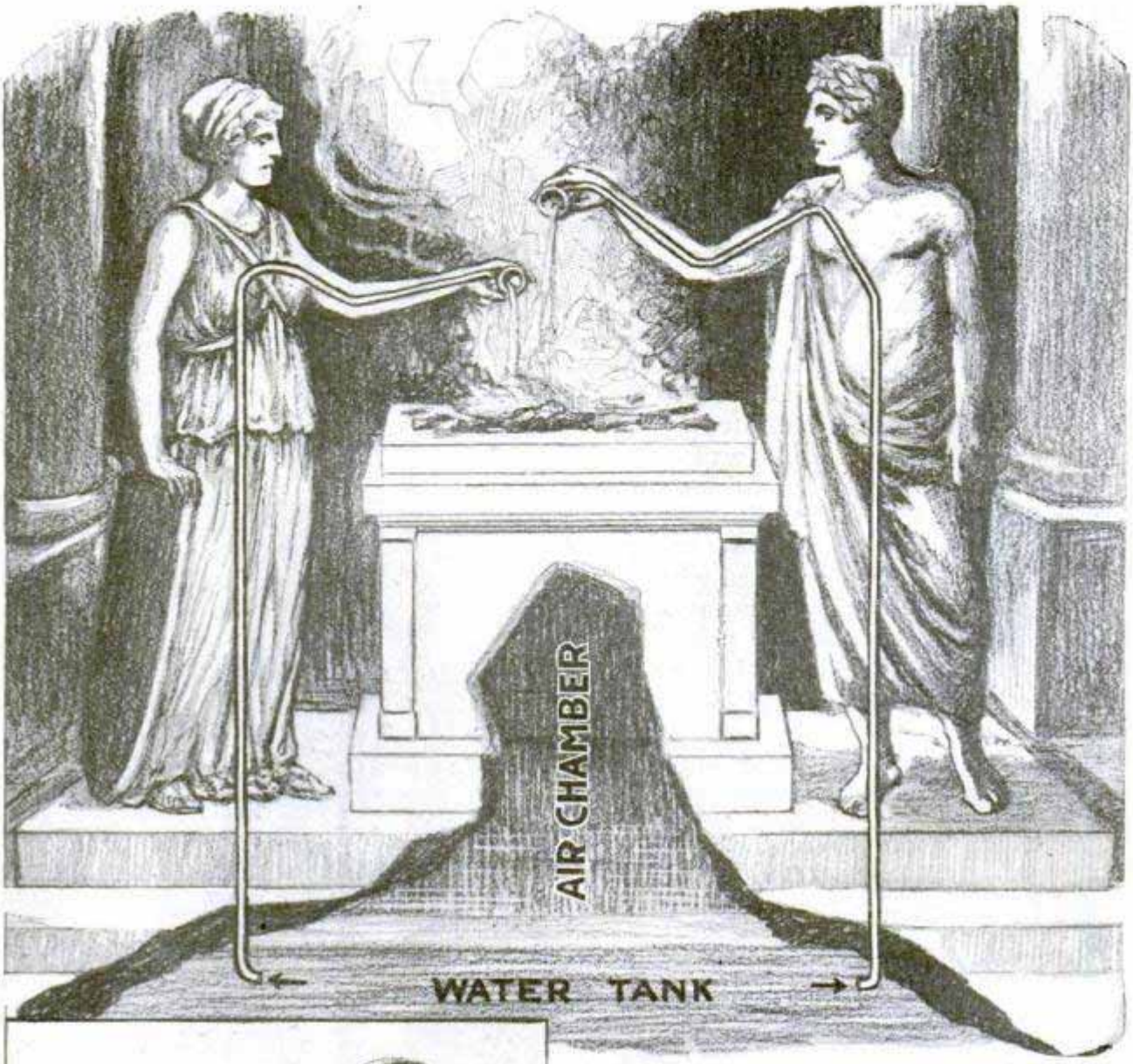

Slot Machine Dispensing Temple Water to Worshipers, and, Above, Statues That Poured Magic Libations

Mechanical devices worked some of the best tricks of the old priests of Thebes and Memphis. In the celebration of the mysteries of the goddess Isis, they announced that victims were carried off by the gods, when machinery had really removed them. Other deceptions were furnished by the aid of sound. There was a labyrinth in or near the temple of Thebes, so built that when the doors were opened, a roar like thunder greeted the worshipers. The priests imitated thunder in subterranean temples to suggest supernatural agencies. Many ancient temples possessed chambers whose existence was known only to the priests, and which served to produce their illusions. Such a chamber was called the "adytum," meaning a "sacred spot not to be trodden on." Today, in the ruins of an ancient temple at Alba, visitors to Rome may see an ady-

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St. James the Elder Combating the Diabolical Enchantments of a Magician, from a Sixteenth-Century Print; Below, "Magic Lantern," Which Frightened Besieging Soldiers Who Saw the Glowing Demon by Night

tum in a fair state of preservation. This secret chamber was located under the apsis, or the large semicircular niche sheltering the image of the god or goddess. The priests gained entrance by a secret door. Between this hiding place and the interior of the temple, a number of tubes pierced the walls and by this means a mysterious voice could be heard in any part of the building.

Travelers who have visited the remains of the temple of Ceres, near Athens, where the celebrated mysteries of Eleusis were performed, have noticed a curious fact. The pavement of its cella, or principal part, is rough and much lower than the level of the adjoining porch, which indicates that a wooden floor, on a level with the portico, covered the present floor, and hid from sight a secret vault designed to operate a mechanism, moving the floor. Vertical and horizontal grooves, as well as holes, were made in the side walls of this temple, to facilitate the motion of the temple floor by the aid of pulleys and counterweights. This floor, allied to phantasmagoria of vivid and terrifying scenes, created an illusion in the mind of the person, initiated at midnight into the strange mysteries of the goddess, that he was

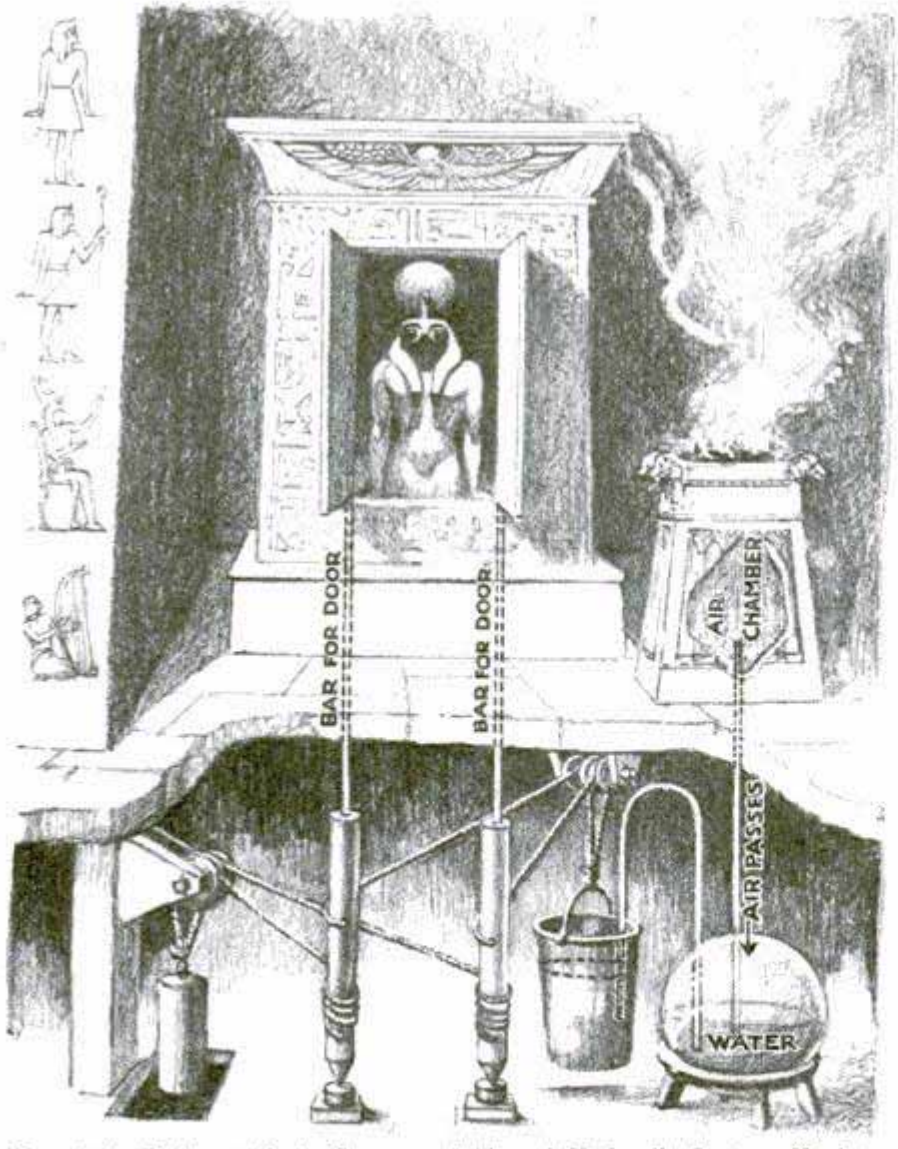
plunged into yawning abysses and shot up to the mountain tops, when all the time he was really standing on the level.

This idea may have been borrowed from India's temple magicians. Apollonius of Tyana, in Asia Minor, a wonder worker who lived in the first century A. D., visited an Indian temple in his travels through Egypt, Mesopotamia and the near east. He was met at the temple doors by Indian priests who led him to the altar of their god, chanting hymns in solemn procession. They struck the earth with batons and the ground moved under them like the waves of a restless sea. The floor rose up to the height of two feet, and then sank to the original level. The striking of sticks was the signal to hidden operators who set machinery in motion elevating the floor of the temple.

Among the buildings uncovered at Pompeii, the famous city buried under a volcanic eruption in Italy, nearly 1,850 years ago, is a temple of Isis, which tells the tale of the mysteries of that Egyptian goddess. It shows a secret stair up which the priests unseen climbed to an opening back of the statue of the goddess, through whose marble lips pretended oracles were given and warnings uttered.

The lands of the magi—old Chaldæa of the Assyrians and the country of the dark white race of the Mediterranean peoples and the Phœnicians—were the home of magic. They are said to have invented a composition resembling gunpowder, and it seems to be a fact that the ancient wonder workers of Chaldæa in wartime actually employed tubes throwing out a brilliant fire with a noise like thunder.

But the magi struck a snag when they tried to deceive the prophet Daniel. The Babylonian king, Nabonidus, challenged Daniel to prove his assertion that the priests of Bel of Babylon were fooling him when they said that the god Bel actually ate and drank offerings of meat and wine. Daniel took up the challenge and set an ingenious trap for the priests. The latter asked the king to order that meat and wine be set out for the god in an underground vault, and to seal the door with his own ring. On the next morning, if he did not find that the god had eaten and drunk the offerings during the night, they would suffer death; otherwise Daniel was to lose his life.



One of the Elaborate Early Compressed-Air and Hydraulic Systems Used to Open Doors, as if by Magic, When Altar Fires Were Lighted

The priests of Bel were not worrying, for they had a secret entrance into the vault by which they were in the habit of coming in to consume the offerings. Daniel merely sprinkled with ashes the floor of

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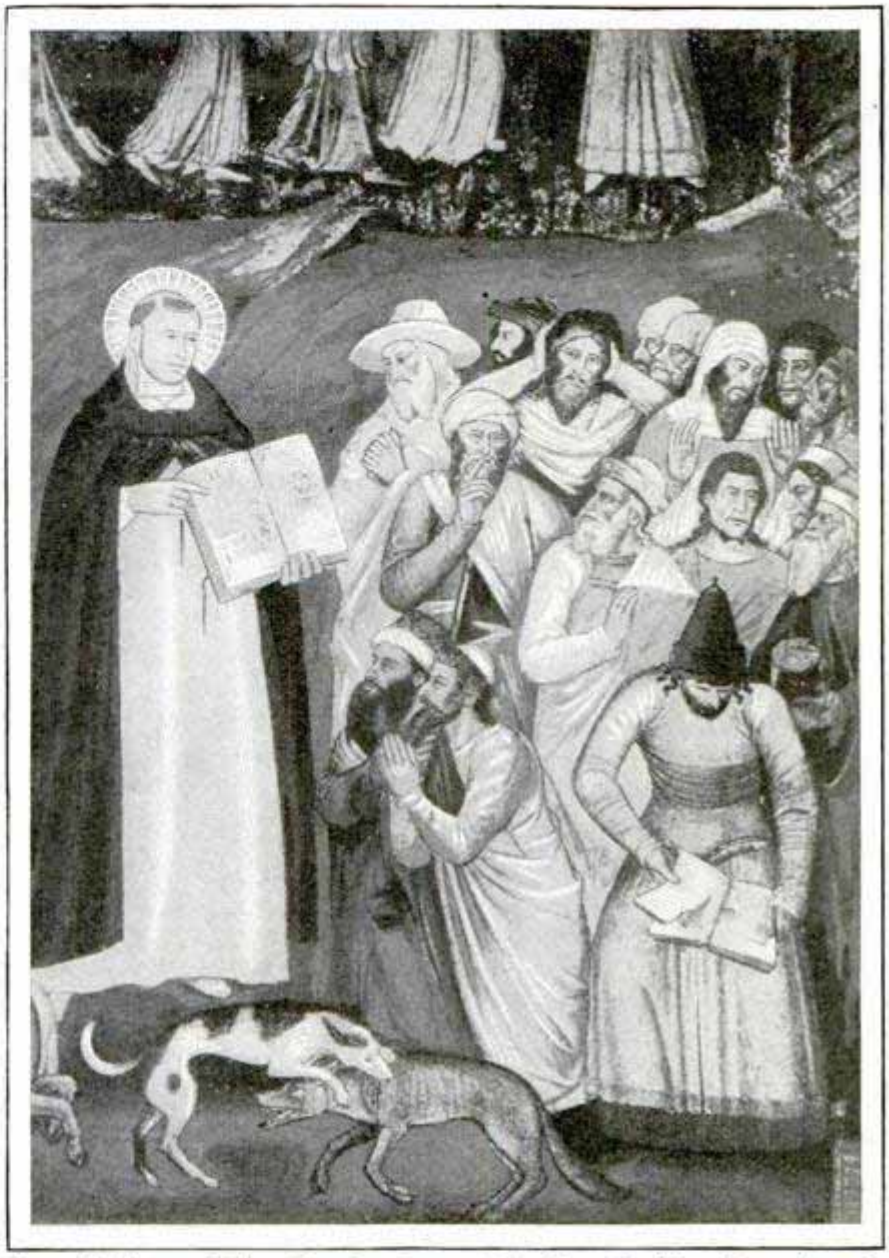
the sealed room in the temple's subterranean regions, and when the king came in the morning he saw the footprints of the tricksters in the ashes.

Some of the best deceptions of the ancient pagans came from their knowledge of sound. The clear and limpid voices of women sounded in the courts of the temple at Delphos, Greece, but there were no singers to be seen. A stone from the river Pactolus gave out trumpet notes which scared away robbers seeking hidden treasure. At Lesbos island, in the Aegean sea, a speaking head of marble uttered oracular responses. Speaking trumpets were known to the temple magicians.

Hydrostatics also entered into temple magic. A marvelous fountain in the isle of Andros discharged wine for seven days and water for the rest of the year. When Augustus, the Roman emperor, came back from the Sicilian wars, a spring of oil was artificially caused to burst forth in Rome to welcome his return. In the city of Elis, at the annual feast of the wine god Bacchus, three empty urns filled themselves with wine, while weeping statues and perpetually burning lamps were all ancient pagan applications of the effects of the equilibrium and pressure of fluids.



Sixteenth-Century Print, Showing Group of Arabian Magicians Repenting of Their Sorceries; One Is Apparently Destroying His Books of Magic

Hero, of Alexandria, the son of a cobbler, gave great help to the temple magicians of Egypt, 120 years before the birth of Christ. He was the first man to use steam to give a rotary movement to a hollow sphere. He describes an apparatus to blow a trumpet on the opening of a temple door. This overawed temple worshipers not in the secret. When the temple door opened, a system of cords, rods and pulleys caused a hemispherical cap, to the upper part of which the trumpet was attached, to sink into a vessel of water. The air, compressed by the water, escaped through the instrument, causing it to sound musical notes.

In another temple, he set up an apparatus which automatically opened the doors, when the fire was lighted on the altar and shut them when the fire was extinguished. The altar was hollow, and when a fire was lighted, the air contained in the interior expanded, and began to press upon the water with which a globe, situated underneath, was filled. The water then rose through a bent tube that conducted it to a pot into which it fell. The pot was suspended upon a cord and,

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Department of Interior
3634 Washington, D.C.

when the water from the globe entered it, the weight was increased and it sank, pulling upon the cords wound round the cylinders in such a way as to open the temple doors.

This is how the doors were made to close automatically: The bent tube connecting the globe and the pot formed a siphon, the longest branch of which entered the globe. When the fire on the altar went out, the air contained in the interior of the hollow altar and in the globe cooled and diminished in pressure. The water in the pot was then drawn into the globe, and the siphon operated until all the water in the pot had passed over to the former. As the pot grew lighter, it rose under the action of the counterweight, and the latter, in its descent, closed the doors by pulling on the cords wound around the cylinders.

Hero also tells of an altar where, when a fire was lighted, statues at the sides poured out libations. The statues were on a pedestal and the altar closed in all sides. A central tube connected the pedestal with the altar, and other tubes led through the statues to cups held in their hands. Water was poured into the pedestal through a hole, which was then at once stopped. When the altar fire was lighted, the air inside expanded, entered the pedestal through the central tube, and forced out the water, which passed up the tubes into the cups in the hands of the statues. They poured out libations as long as the altar fire was alight. When the fire went out, the libations stopped, but as often as the fire was lighted, the libations flowed.

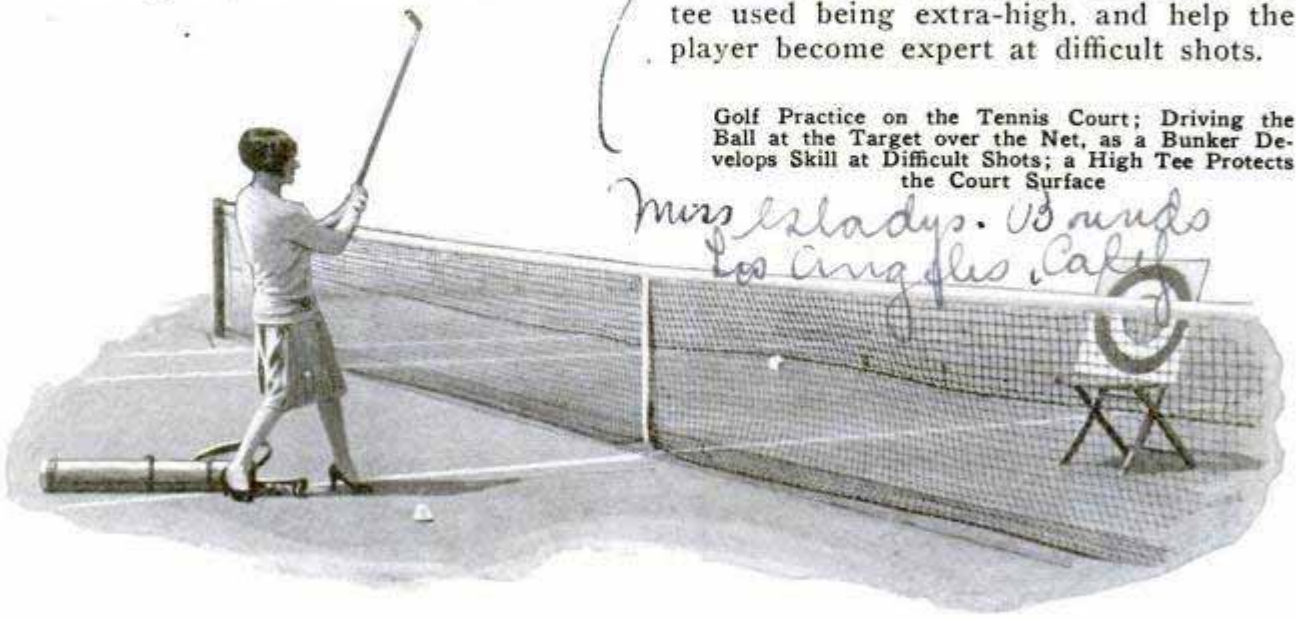
MYSTERY OF "GROWING" ROCKS EXPLAINED BY FREEZING

Numerous inquiries are received by the geological survey from various parts of the country, asking for explanation concerning the apparent tendency of rocks to "grow" in cultivated and other fields. Farmers report that bowlders appearing at the surface are removed, only to be replaced a few seasons later by others. That the farmers' observations are true, the survey realizes, but the rocks, instead of growing in the usual sense of the word, are simply pushed out by the alternate freezing and thawing of the ground. Ice expands when freezing. If it forms under the rock, this tends to push it up and, when ice thaws, the bowlder does not settle back to its original position, as loose soil and other obstructions prop it up. In time, this process may force the stones to the top of the ground. Often these are larger than those that were taken out at first, giving greater foundation for a belief that the rocks actually do grow.

TENNIS NET AS GOLF BUNKER HELPS IMPROVE GAME

3440

Golf practice on the tennis court has been adopted by a California player to give her skill in getting out of sand traps. The net serves as a bunker, and the ball, placed on a tee, is aimed at a bull's-eye target on the other side of the barrier. The trials do not damage the court, the tee used being extra-high, and help the player become expert at difficult shots.

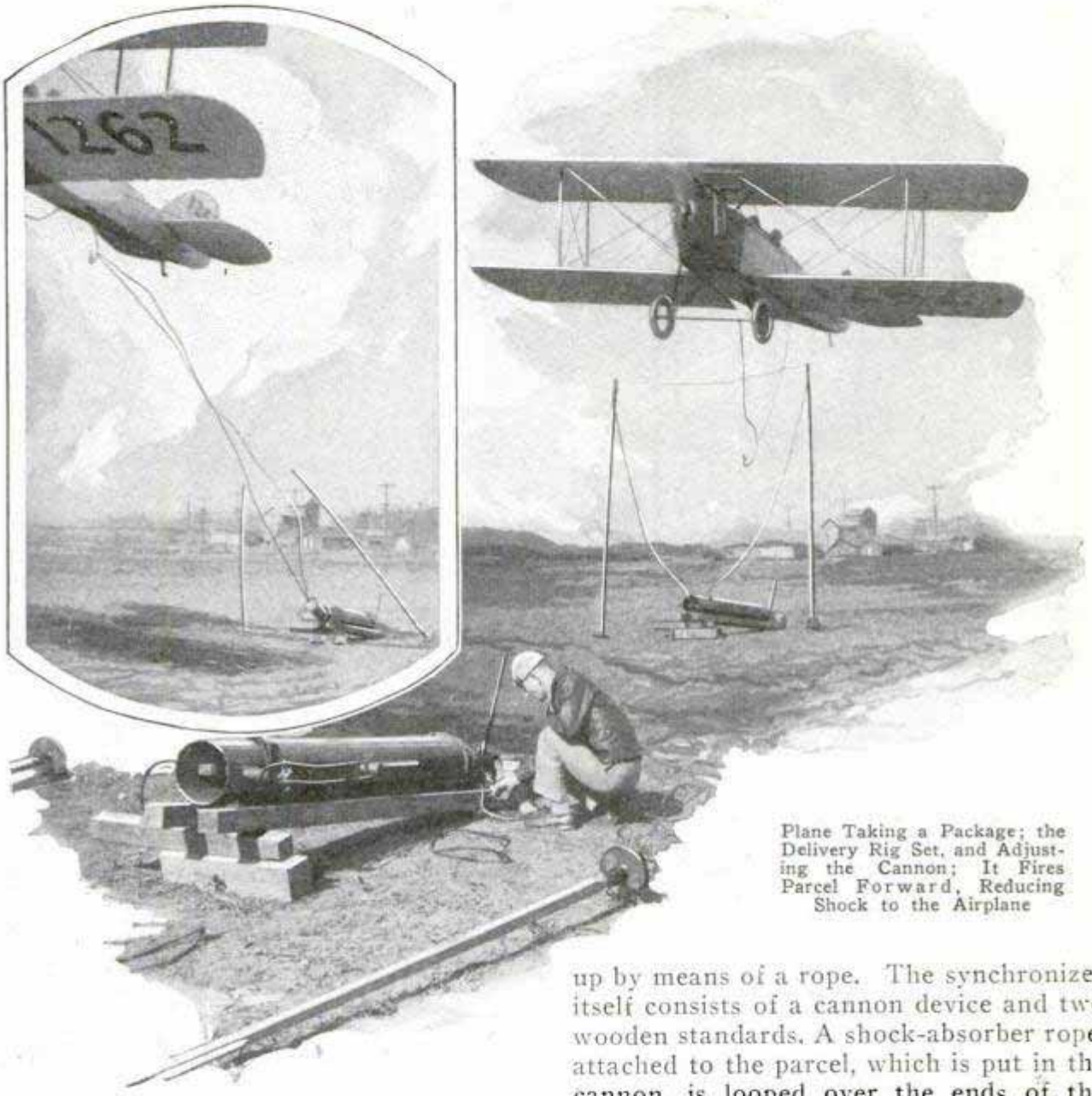


Golf Practice on the Tennis Court; Driving the Ball at the Target over the Net, as a Bunker Develops Skill at Difficult Shots; a High Tee Protects the Court Surface

Miss Gladys. Bounds
Los Angeles, Calif.

3637 Cmt. Alfred C. Sunyan
c/o Journal-Post
Kansas City, Mo.

AIRPLANE PICKS UP PACKAGES SHOT FROM CANNON



Plane Taking a Package; the Delivery Rig Set, and Adjusting the Cannon; It Fires Parcel Forward, Reducing Shock to the Airplane

After years of experiment, a Kansas City aviator has patented a device—a "synchronizing cannon," he calls it—that will enable an airplane to pick up gasoline, air mail, express packages, or other parcels weighing up to 100 pounds while flying at top speed. This feat is not so simple as it sounds. Without such a device an attempt to pick up even a few pounds from a flying field would result in throwing the plane off balance and possibly end in a crash. By means of the cannon, the inventor recently picked up a dozen eggs without a single one being cracked or broken. For demonstration purposes, the airplane was equipped with a long retrieving hook, suspended from the landing gear and drawn up by means of a rope. The synchronizer itself consists of a cannon device and two wooden standards. A shock-absorber rope, attached to the parcel, which is put in the cannon, is looped over the ends of the standards. As the hook takes hold of the rope when the plane passes over it, the standards are pulled over, causing an electric contact which releases a spring. This causes the parcel to be hurled from the mouth of the cannon at a speed of 500 feet a second. As the airplane zooms upward the shock-absorber rope takes up the recoil and lifts the parcel into the plane.

3708

THE BIGGEST SILVER BELL

What is reported will be the largest silver bell ever cast has been ordered for the British warship "Nelson." It will weigh 168 pounds and is being made by an old firm of silversmiths.

Blaine M. Tushorn
Letter Field

Herald Tribune

Where a Locomotive Takes the Air; Swinging Work Engine across Canyon on Steel Cables

ENGINE RIDES ON STEEL CABLE ACROSS DEEP CANYON

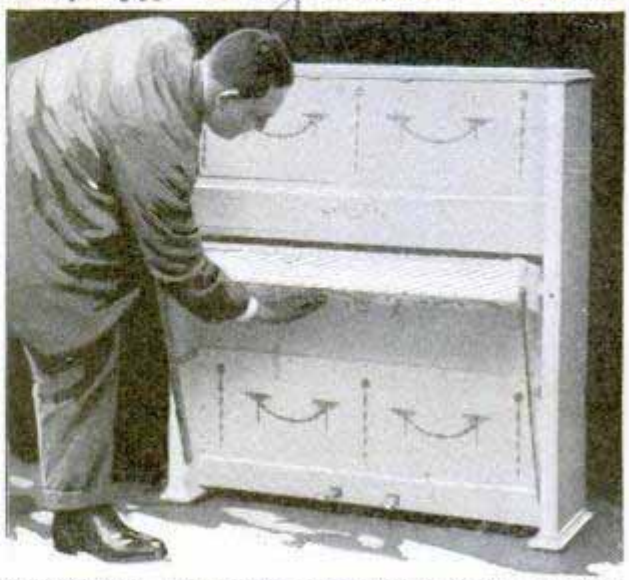
An aerial cable was employed to good advantage near Yakima, Wash., recently in transporting supplies for building a government dam across a canyon several hundred feet deep. The wire was so strongly adjusted that it safely supported the weight of a small locomotive.

WIRED WIRELESS SAVES ROAD MANY MILES OF WIRE

Utilizing wired wireless, or a carrier-current system for long-distance telegraphy and telephony, the Canadian National railroad is saving 24,500 miles of wire—almost enough to girdle the earth at the equator. Eventually the system, which now extends from the headquarters offices at Montreal to Winnipeg, Man., will be continued westward to Vancouver, on the Pacific coast. The part already in service, without adding a single mile of wires and pole line, has added ten two-way telegraph channels, two composite Morse direct-current telegraph circuits and a long-distance telephone circuit. The latter has the distinction of being the pioneer telephone line between eastern and western Canada. It is not to be used for commercial purposes, however, but is reserved for railroad business. The carrier-current system utilizes radio tubes and equipment to broadcast the voice or telegraph signals, but, instead of sending them out into the air, they follow the company's telegraph wires. One unusual thing about the wired wireless is that it is not stopped by breaks or storm trouble, nor is it bothered by the northern lights, which frequently put east-west telegraph lines out of business for many hours. During a recent flood, when a large section of the telegraph line, including both wires and poles, was covered with water, the carrier current got through, when all the usual telegraph facilities were at a standstill.

PIANO WITH FOLDING KEYBOARD SAVES APARTMENT SPACE

When closed, a piano with folding keyboard, recently introduced in England, has a depth of but ten inches. It is especially adapted to yachts, bungalows, small apartments or other places where space is limited. It is about as large as a small bookcase when closed.



It Slips into a Space but Ten Inches Deep; the Tiny Piano with Folding Keys

FAME and FORTUNE Awaiting INVENTORS

The Splash Has Been Removed from Salad-Dressing Mixing by This New French Device, Which Insures More Complete Combination of the Ingredients without Any Loss

AN English society woman not long ago took out a patent on a new burglar alarm. Every door and window in the house was electrically connected to a motor driving a phonograph turntable. If a burglar tampered with any of the connections, the motor would be started and the phonograph begin to play a record in which a whole pack of savage dogs barked lustily.

With the same expenditure of mental effort and ingenuity, she might have produced the automatic phonograph that changes its own records and promises to earn a fortune for its inventor.

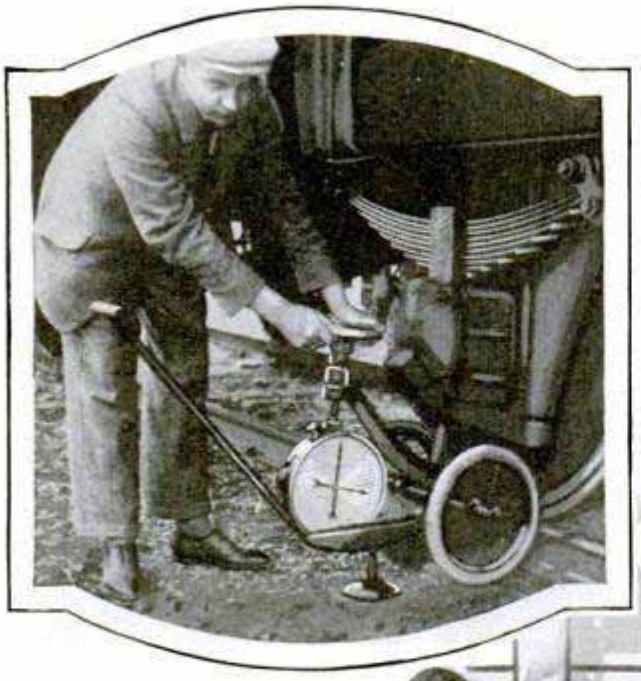
The problem of what not to invent grows more acute every year as the flood of patent applications pours into Washington in constantly increasing streams. They have already reached the total of 80,000 or more a year, and at least 50,000 are being granted. Within a short time the patents issued will reach 1,000 a week.

Out of that vast number, thousands are doomed to disappointment, for they have patented things which the world doesn't want, and therefore find no market awaiting them. The energy wasted on ingenious and impractical inventions is enormous. To reduce such losses, a co-operative organization of English inventors compiles lists of things which, in their opinion, would prove useful and commercially practical, and issues them each year. Their latest annual booklet, "What's Wanted," lists 151 ideas of things which appear to be urgently needed.

Take umbrellas, for example. At first glance that doesn't appear a fruitful field for effort, but the "Institute of Patentees," as the organization is called, points out that both fame and fortune await the inventor who perfects a practical folding umbrella, which can be condensed in a small enough space to drop into the overcoat pocket.

Or perhaps someone can produce a machine that will lay bricks and eliminate the tremendous amount of hard hand labor involved in this occupation. A mechanical brick layer, as the institute sees it, would require the services only of an attendant to keep it supplied with bricks and mortar.

The list of proposed devices range from the simplest to the most complex, but al-

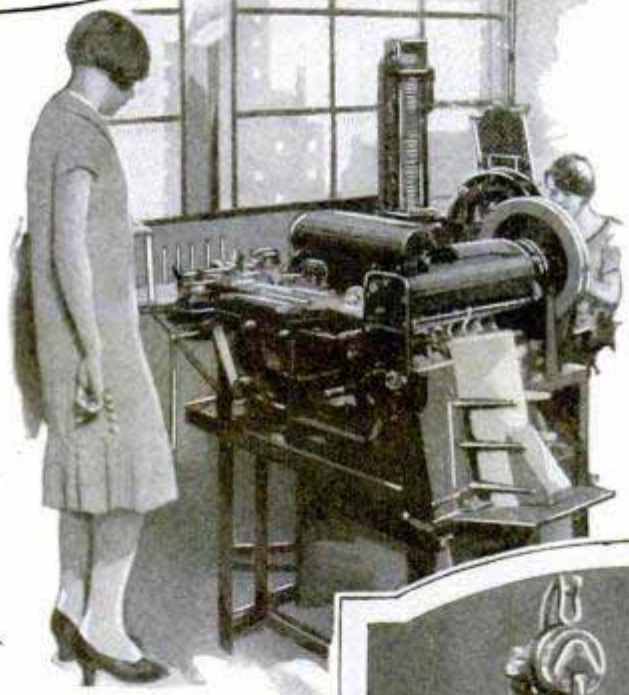


ways either a time, labor or material-saving is emphasized as the reason why they would prove both practical and profitable. A method by which bottles could be uncorked without using a corkscrew and destroying the cork is cited as an example of a simple thing to save material. A device for turning the pages of music on a music rack would save time. A fountain paint brush, holding a couple of pounds of paint at a filling, would be a labor saver.

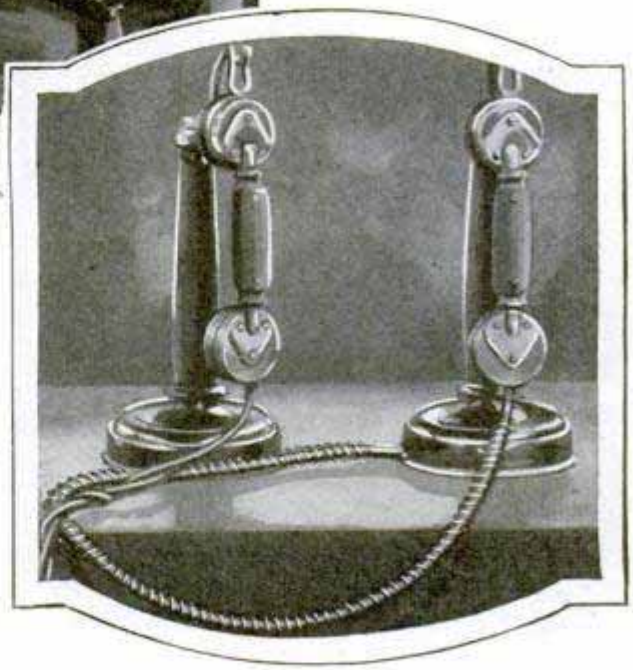
There is a demand for a non-fouling paint for ship bottoms which would repel barnacles, a cheap and practical device for stirring the contents of pots and pans on the kitchen stove, and even an unbreakable shoe lace would bring a handsome award.

Always the institute stresses practicability, though its efforts appear to have done little to stop the flood of weird and wonderful things that appear at every inventors' show. A recent exhibition had, among its displays, a machine for catching ghosts, though the proud inventor who demonstrated it failed to explain what he planned to do with the ghosts after they were caught! Beside it was a vast device, as complicated and probably about as expensive as a battle tank, designed to destroy moths.

The best invention, usually, is the one inspired by necessity. A housewife who noticed that, when the perambulator was brought in after a rain, it dripped muddy water on her hall floor, perfected a simple tray to be placed under the wheels, and had no trouble selling her patent on a royalty basis. Another mother, discovering the baby woke up when lifted from its buggy, invented a detachable perambulator body which could be carried upstairs without disturbing the infant.



Some industrial fields have always been quick to take over worthwhile ideas and develop them, while others are slow to absorb new ideas. Transportation has al-

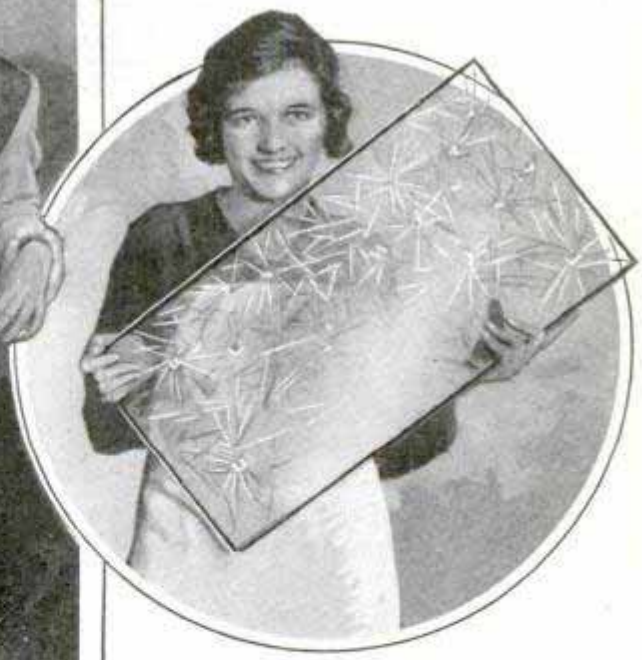


Three Fertile Fields, Transportation, Top, Labor Saving, Center, and a Non-Kinking Coil Guard for the Telephone Cord

NEW IDEAS BEING SHOWN AT INVENTORS' MEETING

Fireproof Asbestos Suit, Gloves and Dust and Fire Masks Demonstrated at a Los Angeles Industrial Conference

An Inventor's Model of His Railroad Crossing Gates, Which Work by Gravity and Eliminate the Services of an Attendant; Transportation Offers a Good Field for New Ideas



Demonstrating a Small Model of a Safety Device for Rescue Work by Firemen, Left, and a Bullet-Proof Windshield, Above; the Invention of Glass That Is Safe against Both Bandits and the Dangers of Accidents Is of Importance to the Automobile Industry; Some Cars Are Now Equipped to Prevent Serious Injuries to Their Passengers in Event of a Crash

Morkrum-Kleinschmidt Co.
1410 Wrightwood Ave
Chicago

The Automatic Printing Telegraph, Operated from a Typewriter Keyboard, Is Typical of Inventions That Have Won Their Owners Both Fame and Fortune

ways been a good field for inventors. Railroad safety devices, new signals, and even an improvement on some minor part of a car or locomotive are soon placed in service. The modern freight car, for example, is a collection of patented parts that represent the work of many inventors. There are patent doors with patent locks, patent roofs and sides, and all the mechanism beneath the floor has been slowly evolved bit by bit as inventors have added and improved.

At the other extreme in size, cameras have offered financial awards. The inventor of the simple device known as the autographic back, which permits writing on and dating each picture as it is taken, is reported to have obtained $300,000 for his patent. Another inventor quite recently brought out a camera in which it is impossible to take two pictures on the same film, for the action of taking one automatically moves the film up for the next exposure.

Considering the number of people who have hunted in vain to find a permanent paint or polish for stoves, it isn't hard to compute the possible financial award for the man who may succeed. A similar reward may await the man who invents a non-slippery floor polish, an unbreakable, unblurable and flexible glass, or a means of cleaning windows by machinery.

The inventive genius who perfects a chemical composition to absorb the carbon monoxide and carbon dioxide which make the air of a closed room unhealthy after occupancy for some time, is scheduled to reap his reward, for such a discovery would have widespread use in many other fields. There are fortunes also for the first to perfect 100-per-cent holeproof stockings, and for the man clever enough to solve, once for all, the problem of pipes that freeze in winter.

Some housewife may discover how to raise cakes and bread without the use of yeast or baking powders, and another may be the one who will solve the problem of laying carpets without the use of tacks, and in a manner that will permit their being taken up and cleaned as easily as loose rugs are removed.

Typists will appreciate an attachment

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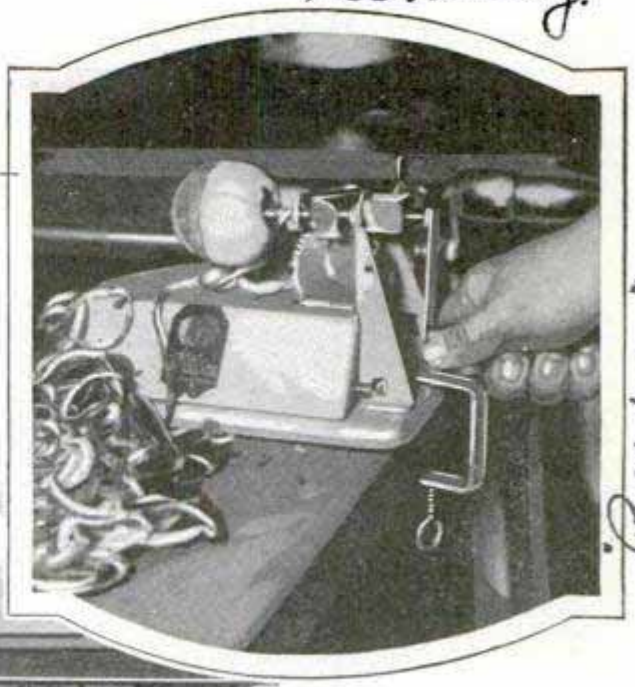
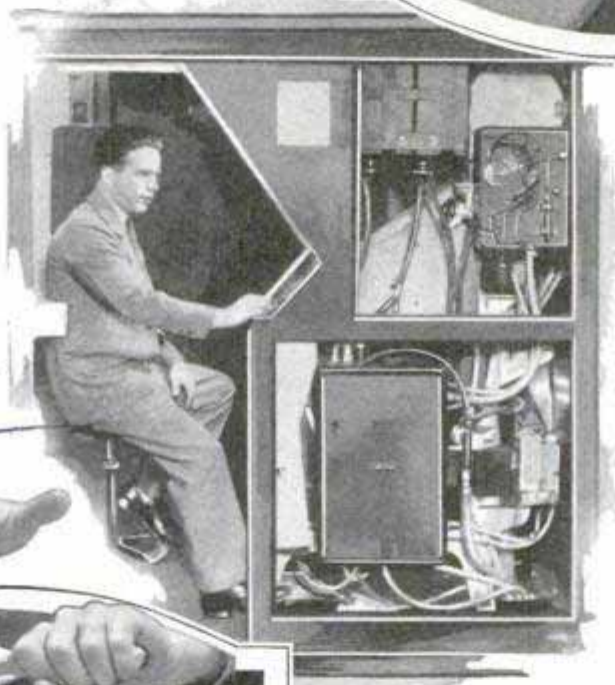
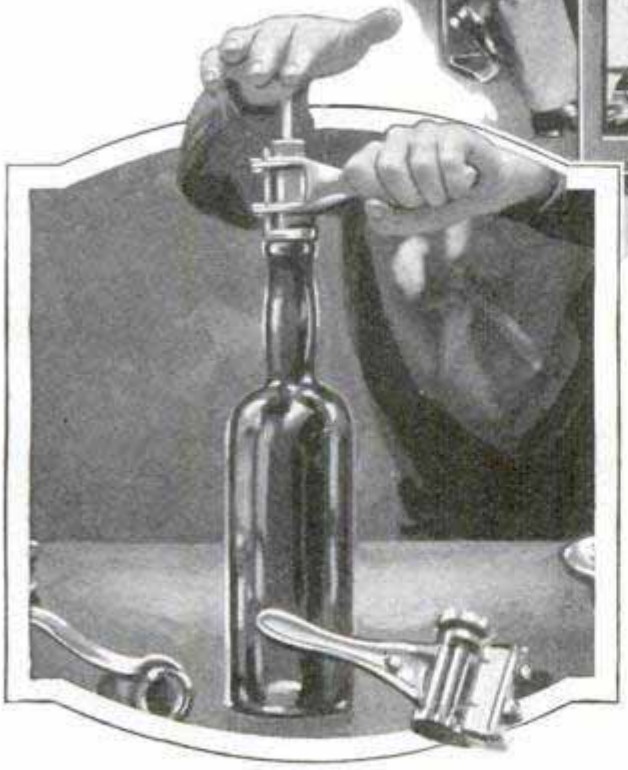
for the typewriter that will sound a warning signal just before they reach the bottom of the page. Some of the other things the institute sees a future for are a less brittle and more easily repaired tortoise shell or imitation tortoise shell, and a floor covering that will permit furniture to be moved at will without the necessity of lifting it.

New and improved devices for communication, for saving time and labor in offices, factories, homes and on the farm are almost sure of being well received.

One which probably would find immediate favor in street-railway circles is an arrangement which would prevent passengers stepping off a car while facing in any direction except that in which the car is moving. Getting off backward is a cause of many accidents. Photographers would welcome a type of plate holder that would prevent the admission of any light to the camera while the holder was being inserted or removed. There is also a demand in the photographic field for self-toning papers and better and quicker developing processes. The young Russian inventor who recently sold an automatic camera in New York for $1,000,000 is a typical example of the high rewards paid for inventions which possess such a wide-spread appeal and so many various fields of utilization as pictures do.





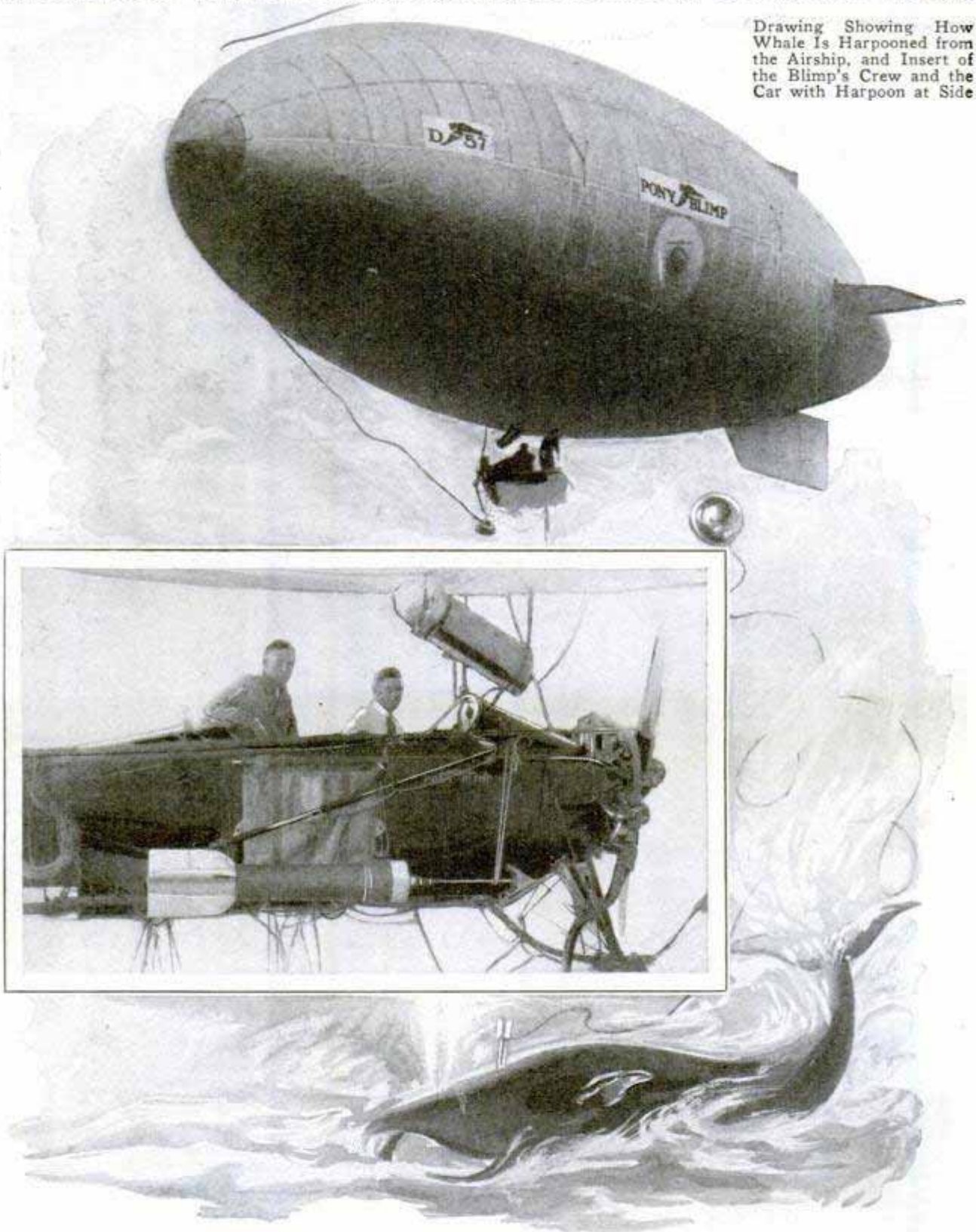


Corkscrew That Keeps the Cork from Expanding, so It Can Be Replaced; an Automatic Picture Studio and, Top, a Vegetable Peeler for the Home

Even the lowly collar button can stand further improvements, as there probably would be an excellent field for one of some other design than the pivoted-head type, which could be inserted and removed without damaging the collar.

The point for the inventor to remember is that the cost must not be out of proportion to the benefits derived and that the saving in time, labor or material must be so apparent that the invention will overcome the sales resistance it will meet.

HUNTING WHALES FROM AIR LATEST FLYING IDEA



Drawing Showing How Whale Is Harpooned from the Airship, and Insert of the Blimp's Crew and the Car with Harpoon at Side

Small blimps may supplement boats in the whaling industry if plans of a California man materialize. He proposes to use the small dirigibles to scout over the sea and locate the whales. A harpoon would be thrown from the gondola of the airship and attached to the dart would be a small rubber buoy which would be inflated from a compressed-air tank. This buoy would serve as a marker for the guidance of men in the killing boats as it would rise every time the whale rose to blow during its fight for life and when it died. Tests have shown that the plan has practical

possibilities. A small dirigible was flown out over the Pacific off southern California. A raft, towed by a motorboat, was used as a target. In eight throws out of twelve, a harpoon stuck into the raft, although it was towed in a zigzag course as the motorboat sped along at a rate of twelve miles an hour.

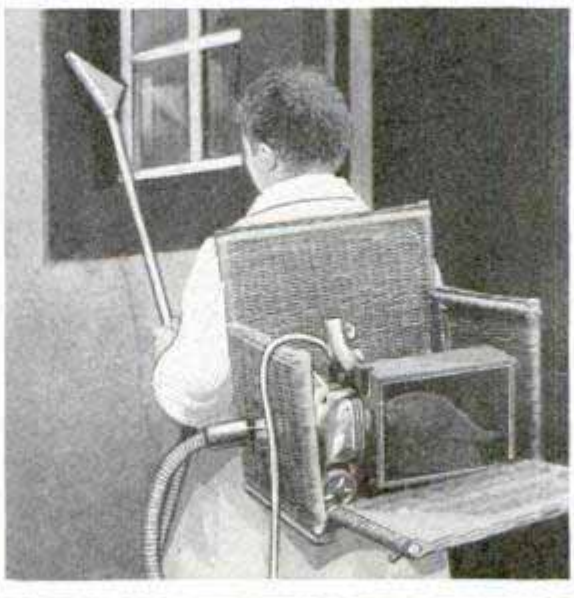
As Pupils Speak into the Mouthpieces, a Visual Reproduction of the Sound Waves Is Made in Table Cabinet

PAINT FROM WOOD

Making roof paint and other by-products from pinyon wood is the interesting process a western man has patented and with which he has had considerable success. His homemade outfit has already yielded a return of $1,500, it is said. A cord of the wood will produce forty gallons of paint and a like quantity of other materials, including creosote, turpentine and similar fluids, in five hours. One of the first stages in the process is to cook the wood and extract the materials in a retort specially constructed for the purpose.

VACUUM TO CLEAN EXTERIORS KEEPS BUILDINGS BRIGHT

As a substitute for washing, a vacuum cleaner designed by a German inventor, to keep the exteriors of buildings free from dust and soot, operates from a lighting socket and is easily carried about. Extensions are provided for reaching nearly all parts of the walls from the windows. The outfit is also suitable for cleaning the inside of autos and for household use.



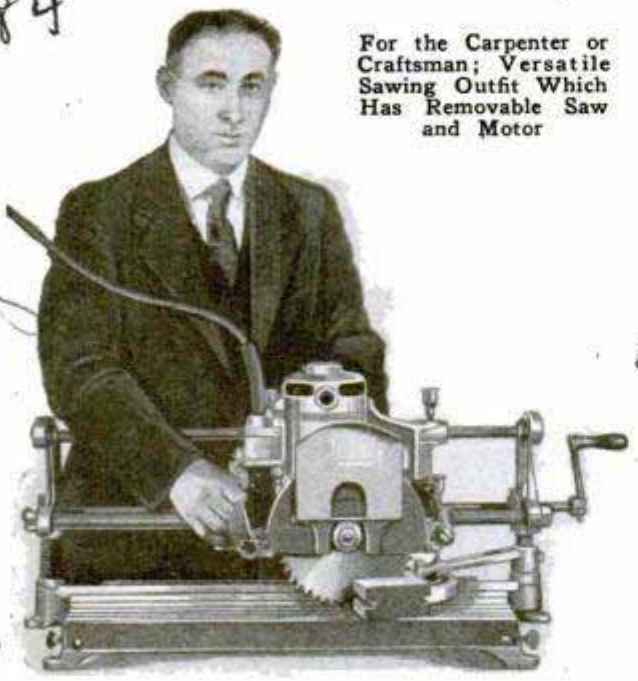
Cleaning the Outside of a Building with the Vacuum Apparatus; It Operates from a Lighting Socket

PICTURES OF VOICE HELP DEAF IN LEARNING SPEECH

Sound is an almost unknown quantity to a person who is extremely deaf, consequently it is difficult for teachers of deaf children to make them use their vocal organs in the proper way. This task has been simplified at a Pennsylvania school with the aid of a small instrument which translates the vibrations of the voice into visible light waves. Thus, by looking into the mirrors of the unit, the pupil may see the "picture" of the teacher's voice and then strive to make an exact copy of it by his own tones. The apparatus is said to have improved both the volume and tone of the deaf children's voices as well as aided in making their progress in intelligible speech more rapid.

¶Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine.

PORTABLE AND STATIONARY SAW COMBINED IN ONE



For the Carpenter or Craftsman; Versatile Sawing Outfit Which Has Removable Saw and Motor

Constituting a small woodworking plant in one unit, a combination stationary and portable saw, now on the market, has a stand for single and double angle cuts as well as for ripping up to depths of two and three-fourths inches. The saw may be quickly removed from the frame when it is to be used as a portable tool. Power is supplied through a one-half-horsepower motor operated from a house socket. The outfit is also supplied with a jigsaw attachment, and a drill chuck or emery wheel may be connected, if desired, after removing the saw from the arbor.

OVER QUARTER MILLION VOLTS CARRIED FOUR HUNDRED MILES

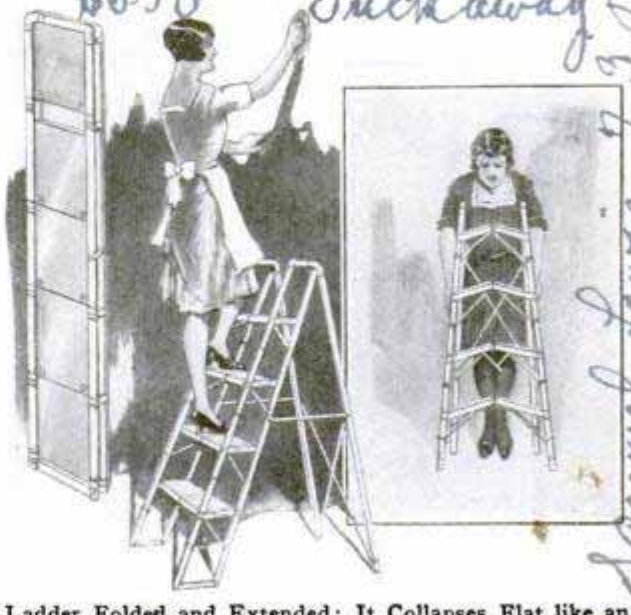
Carrying electric power of 380,000 volts over a 400-mile transmission line without leakage (corona) losses is the feat accomplished by German engineers in a new overhead system. Power is generated at both ends and at intermediate points and the system is thus a co-operative combination, coal being used for generation at the west-German end and hydroelectric plants at the southern end, especially in the summer and fall when the Alpine streams furnish abundant water. The salient feature of the installation is the use of specially designed hollow metallic tubes for conductors instead of solid-copper wires, which would have to be of enormous size, and hence costly. The line cost about $38,000 per mile, or about the same as a railroad, but as hundreds of millions, and eventually billions, of kilowatt-hours will be supplied, the price per unit to consumers will not be abnormal. The masts carrying the conductor are 100 feet tall and occupy a ground space, at their base, about thirty-three feet square.

DE-PUCKERING PERSIMMONS

By sealing them in waxed papers, persimmons are freed of their bitter taste while in shipment, a California professor has found. This is believed to be due to the action of gas liberated from the fruit. The same sweetening effect is obtained by placing the persimmons in tightly sealed containers. There are various vapors and gases that will remove the "pucker," but it was found that these sometimes gave the fruit an objectionable taste and also discolored it.

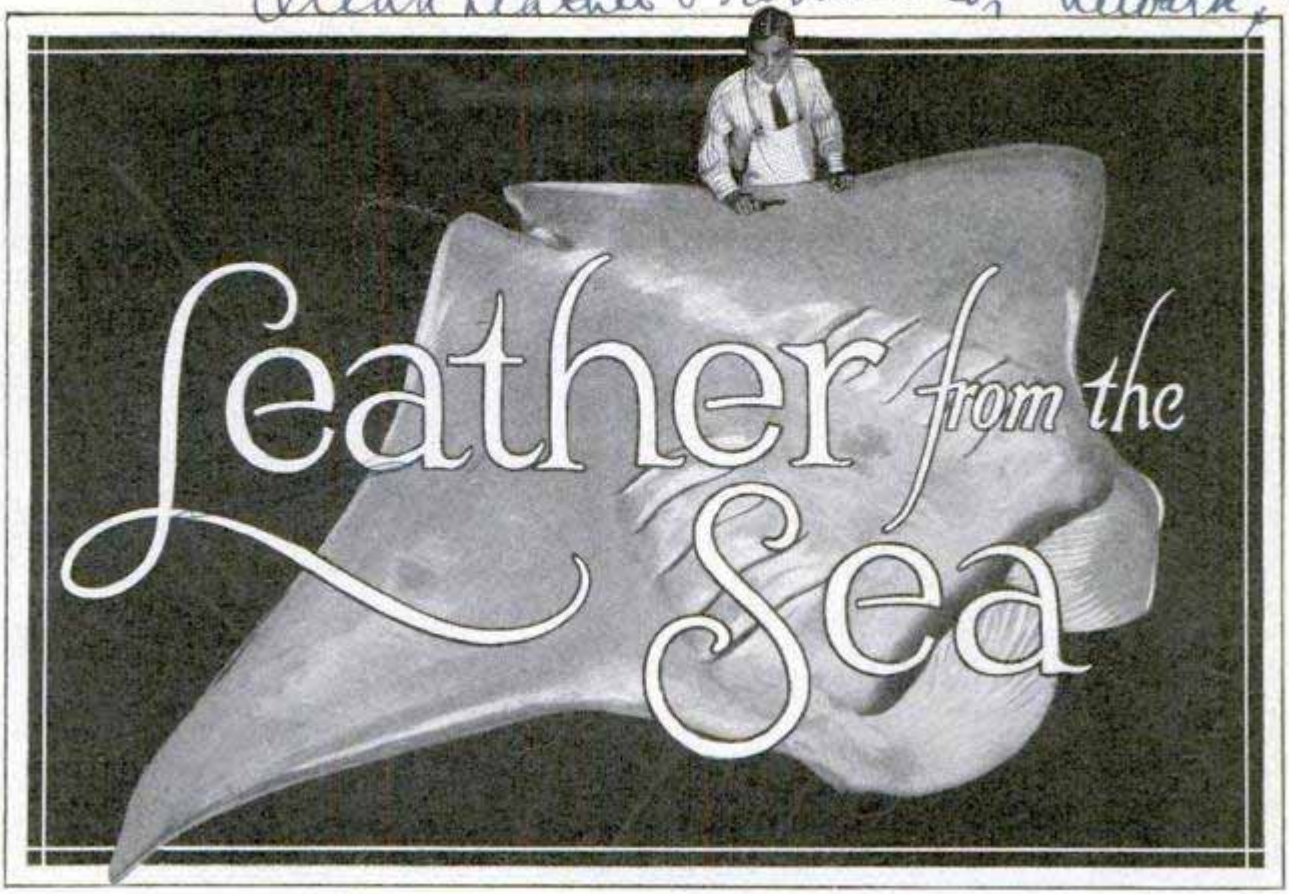
SAFETY LADDER FOLDS FLAT LIKE AN IRONING BOARD

Safety and convenience are combined in a stepladder that folds up like an ironing board, when not in use, and weighs but fifteen pounds. It is said to support a load of 500 pounds without hazard, a rubber base prevents slipping, and the top step is protected by hand and leg braces. It is fifty-two inches high.



Ladder Folded and Extended; It Collapses Flat like an Ironing Board

1651 Shark skin - Sea Leather Corp
6118 Arcade Bldg. Seattle, Wash
Ocean Leather Products Co. Newark, N.J.



Leather from the Sea

The Huge Manta, or Giant Ox Ray, Largest of All the Ray-Fish Family, Yields a Fine Quality of Leather, Though It Has Not Been Found in Sufficient Numbers to Start an Industry

By HAMILTON M. WRIGHT, 15 Park Row New York.

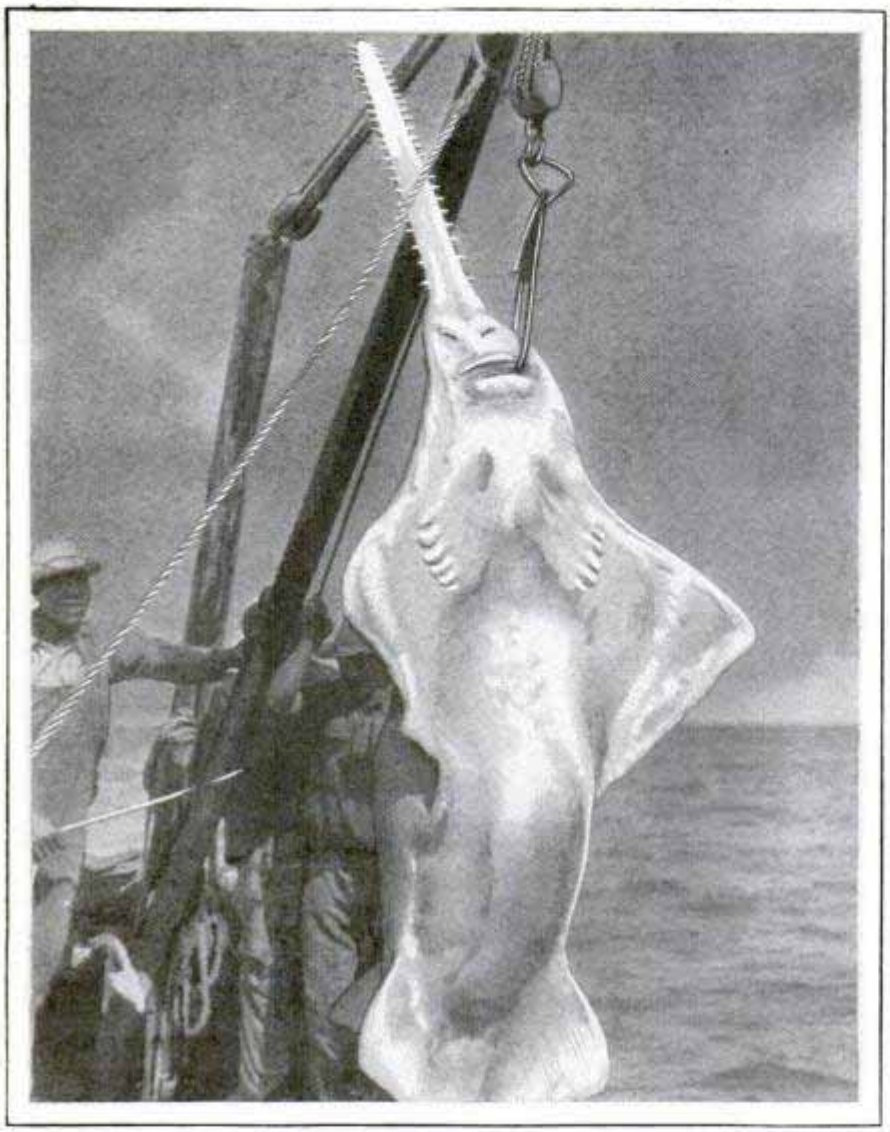
IF a buyer had been told a few years ago that inexhaustible supplies of the finest leather were to be had from the sea, requiring no pasturage, superintendence, or other financial outlays, he would have considered his informant an idle dreamer.

Wholesale leather dealers, however, are now obtaining marine leather from man's traditional enemy, the shark, and the sawfish, a huge member of the ray family and closely allied to the sharks, has recently been added to the list of commercial leather producers. It yields a leather pronounced quite as valuable, commercially, as that of the shark. Shark leather, owing to its peculiar fabric and crossweave, has far greater strength than most other animal leathers. When treated and tanned, it becomes very soft and pliable, yet tough, and shows great resistance to stretching. Made into shoes, it is as nearly indestructible as any material which can be manufactured into comfortable footwear. It is also finding use for upholstery and luggage covering.

Many sharks yield leather of beautiful hue. The leather of the dreaded leopard shark, with its exquisite markings, can be used in the most ornamental upholsteries and is so tough as to be practically indestructible.

The abundance of sharks in many parts of the tropical oceans, the ease and economy with which they can be captured, as well as of the proximity of the shark-fishing stations to ports from which the hides can be exported without reshipment to the great leather centers, are attracting many to the possibilities of shark leather as a world-wide industry. That shark leather presents the basis of a big industry not possible in the case of many other marine animals is pointed out. Though other creatures of the sea, such as the walrus, a mammal, yield valuable pelts, their quest is often attended by numerous difficulties and dangers.

The walrus which yields a valuable pelt is generally found in arctic and antarctic waters, remote from lines of travel and therefore reached at considerable expense. While the aggregate yield of walrus pelts amounts to considerable value, the supply comes in slowly from scattered stations.



Landing a Giant Sawfish off Key West, Where the Sea Yields Many Specimens Suitable for Conversion into Leather

Walruses are not taken in sufficient numbers in any one location to render their hunting commercially attractive, and the catch is usually limited to certain seasons of the year. This condition is true of whales, porpoises and many other forms of marine life which, though existing in large numbers, are normally so thinly distributed as to be unattractive to a large industry. Sharks, however, are often found localized in vast numbers where the food supply is abundant and where their depletion through fishing is made up by other sharks attracted by the presence of food.

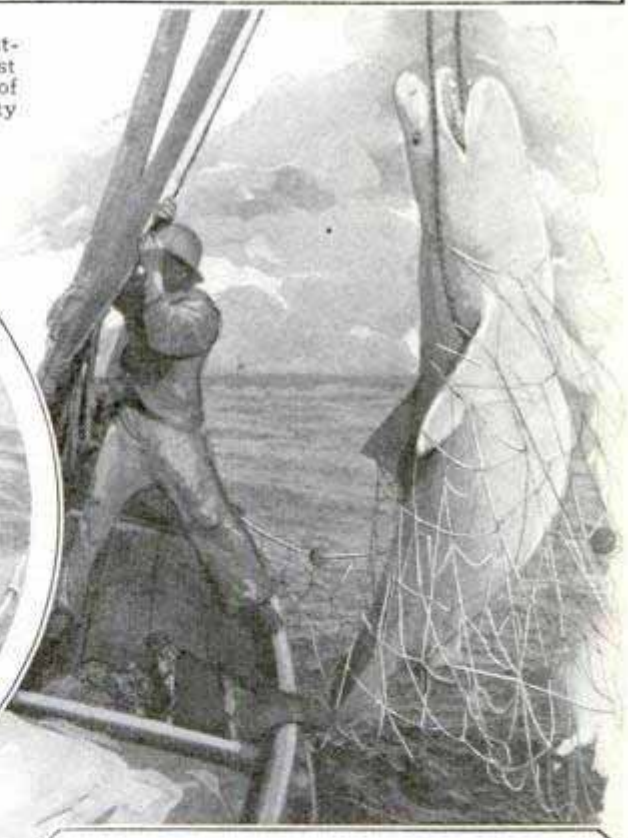
Several years ago a shark-tanning station was established on Big Pine key, one of the larger islands in the chain which extend from the southern tip of the Florida peninsula. Another station has recently been started in the vicinity of Key West. In order to see at first hand this strange industry, the writer and a companion made an entire circuit of the Florida keys, and watched the shark fishermen at work.

The annual catch of edible fishes in this region reaches many millions of pounds. It is no unusual thing in the Florida keys for sharks to cause a fisherman who uses hand lines to abandon his anchorage for the day, so vicious and persistent is their attack on the fishes which he and his men are pulling in. Although the sawfish will seldom rob fish lines, it is scarcely less detested by fishermen.

All sharks and sawfishes large enough for commercial leather are caught in gill nets. Hand fishing or spearing would be too slow. The capture of a big shark with a heavy line is strenuous and often dangerous. A big shark can tow an ordinary-sized launch for several hours. It could easily pull a man from a wharf or moored launch, while, if an attempt is made to snub the line and bring it up short, the shark will bring its weight against the rope and break the heaviest sash cord as though it were a piece of cotton thread. Gill nets, therefore, furnish the only expeditious means of commercial shark fishing. They are enormous affairs, several hundred yards in length, twenty feet or so in depth, buoyed up at the top with cypress plugs and weighted at the bottom with lead.

When a shark is caught he raises a fearful commotion in the net. He lifts the leaden slugs from the bottom as he surges forward and pulls the cypress buoys beneath the water. The net of heavy cord slips neatly behind his gill crevices, restricting his breathing. When hauled to the surface, the sharks are almost invariably dead, having drowned themselves in

A Day's Catch of Sharks and Sawfish on a Landing Platform at a Shark Station, Ready to Be Flayed as the First Step in Producing Marine Leather; Below, a Party of Fishermen Are Preparing to Cast Their Shark Nets Sixty Miles off Key West



In Their Desperate Fight against the Nets, the Sharks Drown Themselves and Are Pulled Aboard without a Struggle; Here Is a 1,600-Pound Specimen Caught by the Key West Leather Fishermen; It Belongs to the Leopard-Shark Family; Shark-Fishing Industries Are Thriving in Several Parts of the World, Including Australia

their frantic efforts to escape. As the meshes of the net are of similar size, there is considerable uniformity in the size of the sharks which are brought to the surface when the nets are hauled up in early morning. Sharks prowl around most ac-

Worth a Dollar Each When Sold for the Chinese Food Trade; a Pair of Shark Fins

tively at night, and usually follow the tide. Fishermen are well aware of this habit. As many as three hundred big sharks have been taken in a single night at Big Pine, but there is no record of any man having been attacked by sharks in these regions.

The sawfishes, which are more lethargic than the sharks, are found alive in the nets. They are hauled to the surface by a block and tackle on the fish boat, and are then clubbed to death. Their long, flat snouts are sawed off, and the huge bodies, weighing from 600 to 1,900 pounds, and from thirteen to twenty feet long, are hoisted upon the big, wide fishing boats, the nets are raised from the water and also hoisted aboard, and the launch sets out for the skinning station.

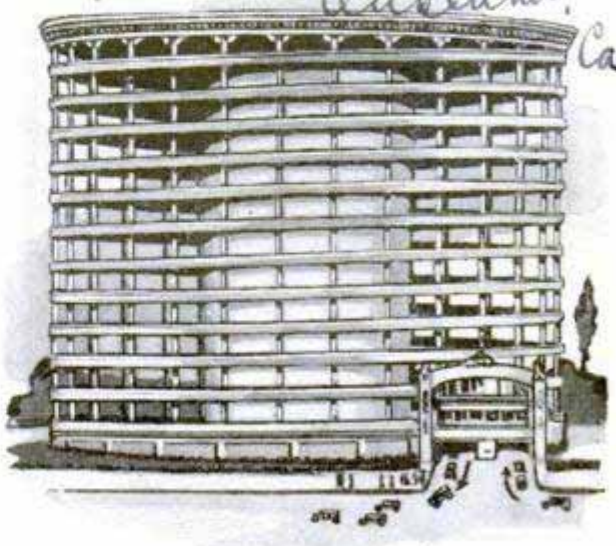
Arrived there, the nets—the fishermen's first care—are raised to the docks and spread on racks to dry and also for the repairs which are necessary in the capture of such powerful and savage fish. Then the great bodies are hoisted to the dock by winches.

The skin of both sharks and sawfishes is then rapidly flayed from the body. The operation requires only a couple of minutes by expert hands, and the hide is placed, inside out, over a cylindrically shaped table and all adhering flesh is carefully removed. It is then salted and set out in the sun to dry for twenty-four hours, when it is removed to the shed to await export to the north, where the final touch in finishing is applied. When salted and dried, the flesh of the shark is of the consistency of dried codfish and almost pure white in color. The oil, it may be observed, is almost entirely confined to the liver, and is not apparent in the flesh. The head, when boiled, yields a large amount of glue, while from the pancreatic gland a rich content of insulin of value in the treatment of diabetes may be taken. The enormous bones of the jaws, when stripped of flesh and cured, make trophies for which good prices are paid, while walking sticks can be made of the backbones.

The ordinary run of sharks taken in the Florida keys yields a pelt much smaller than that of a grown steer, thirty-six to forty inches each way being a fair average. The enormous head and great tail, which add immensely to its size, do not figure in the cutting of leather, which is taken from the larger circumference of the body. The sawfish, being characterized by great girth, yields a larger pelt than the shark.

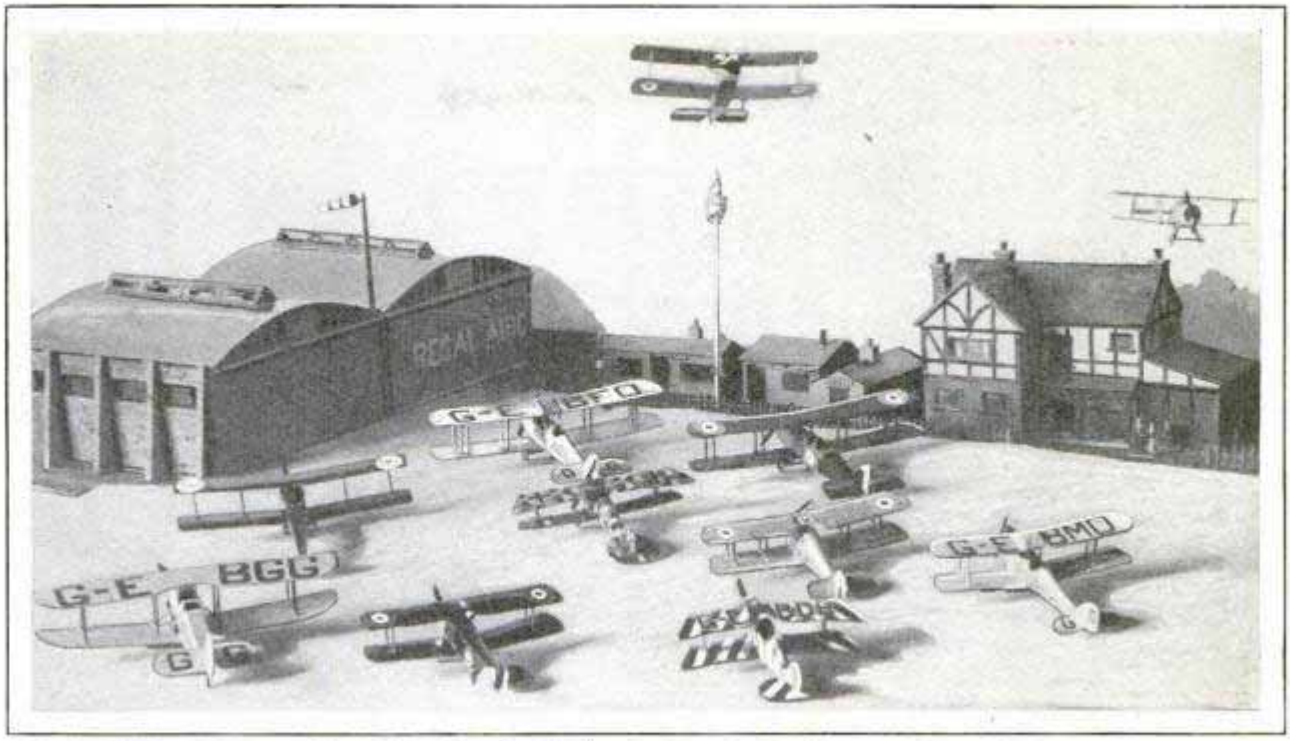
SPIRAL SKYSCRAPER FOR AUTOS HELPS PARKING PROBLEM

As a solution of the automobile parking question, a western inventor has devised a skyscraper roundhouse for storing cars. It is simply a large spiral with wide passageways for running the autos up or down, and with storage space for many machines on each floor. The spiral has an easy grade, requiring little effort to ascend, and exits may be made in safety.



Drawing of the Proposed Spiral Garage for City Parking; Wide Storage Space Is Provided on Each Floor

3595 Owner - R. S. Allen



Model Flying Field and Tiny Ships Closely Fashioned after the Real Planes; Part of Collection of an Aviation Enthusiast Who Marks Changing Styles in Aircraft with His Faithful Replicas

COLLECTION OF MODEL PLANES SUGGESTS NEW HOBBY

Aviation has introduced many new ideas, among them a possible addition to the wide field of collecting. An eastern enthusiast has assembled an interesting group of cardboard models of real planes on a replica of a landing field. The tiny ships are fashioned to the scale of about a quarter of an inch to the foot, and present a graphic picture of the development and progress in flying.

3653

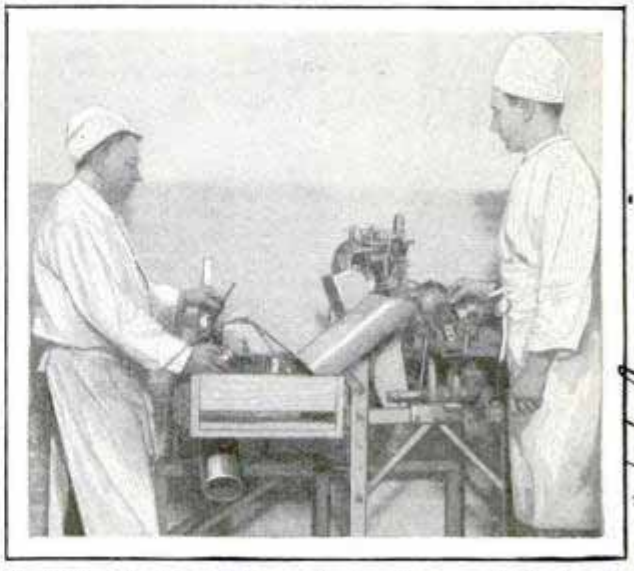
A PULMOTOR FOR TREES

Trees weakened by insufficient oxygen, due to obstructions or surplus water about the roots, are restored to vigorous growth by a special "pulmotor" treatment which is said to have been administered with good results. It consists in forcing air currents about the roots. This is done with the aid of a compressor operating at about 100 pounds' pressure and a long hollow "gun" with a shut-off. The gun is forced into the ground to the depth of the roots as far from the tree as the ends of the branches. The air is then turned on and off, the action of the air being visible to the operator by the rise and fall of the earth. This draft not only supplies the tree with needed oxygen but drives away poisons that have accumulated in the soil. Leaves which have withered resume their freshness in a short time, and trees that apparently were dead have taken on new life after forty-eight hours of the pulmotor treatment.

PEELER AND CORER FOR APPLES SPEEDS MAKING PIES

1978

One of the appliances which saves time and labor in large bake shops is a mechanical apple peeler, corer and slicer. It prepares the fruit for pies.

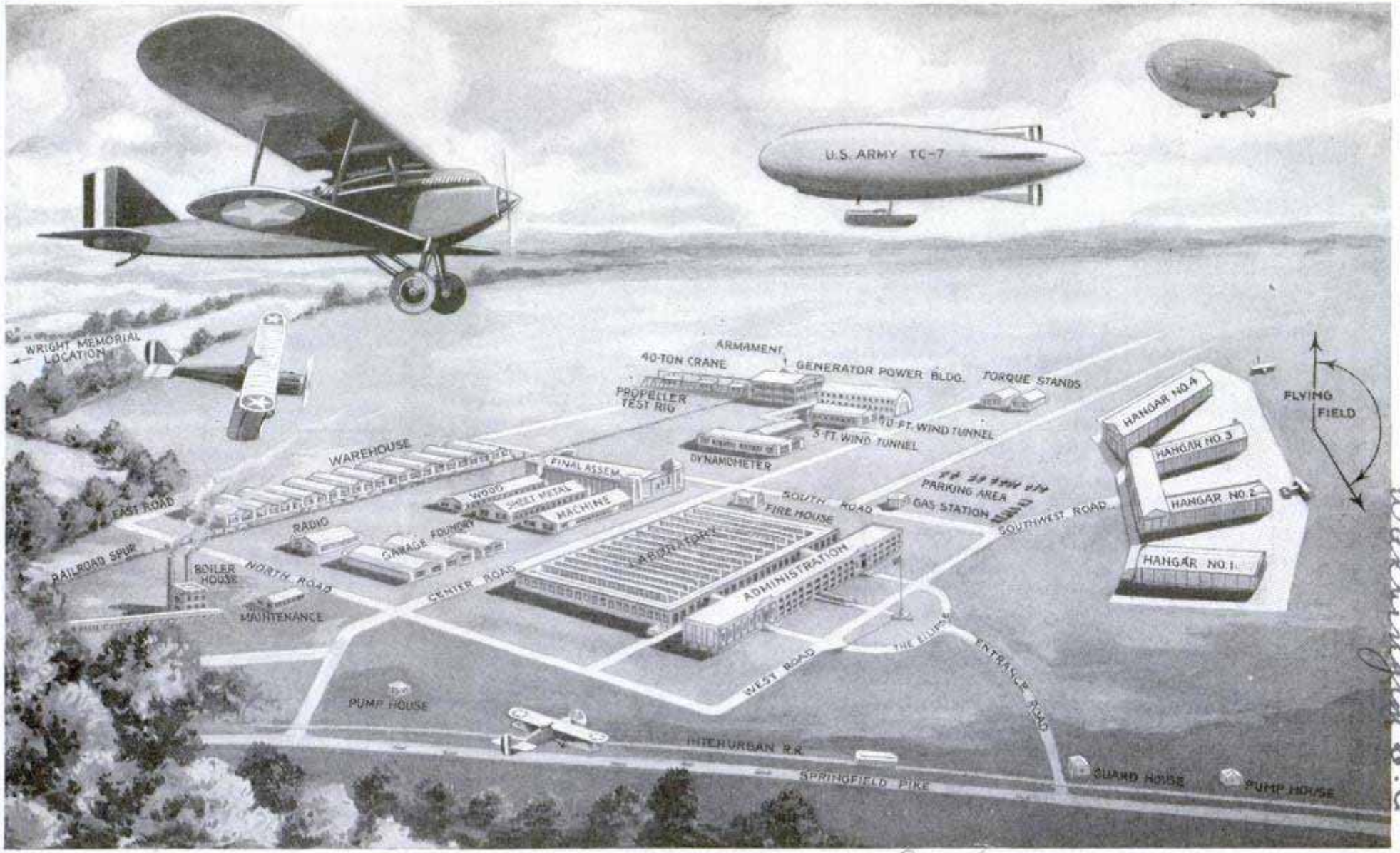


To Help the Pie Baker; Apple Corer and Peeler for Preparing Large Quantities of Fruit

Apple coring & peeling machines Sprague Sells Canning Machinery Co 500 N. Dearborn Chicago

Chas. F. Irish Co. Bratenahl Cleveland.

Used by E. M. Hattler Boston Mass



McCook Field, Famous Army Air Experimental Laboratory, Has Been Superseded by Wilbur Wright Field. Above, the First Complete and Systematically Planned Laboratory, Factory and Flying Ground; It Is Built on the Site Where the Wright Brothers Did Their First Dayton Flying

PAPER FROM WILD PINEAPPLE

For many years, natives of Brazil have relied upon the fibers of a species of wild pineapple to supply them with twine for their fishing lines and nets, and now government scientists here have turned to the plant as a possible source of paper, suitable for the printing of bonds and currency. Tests by the bureau of standards have shown that the product has a bursting strength about the same as that specified for the finest papers made from rags or rope. At present, there is no great cultivation of the pineapple plant, but investigators believe that an abundant supply could be obtained should the demand arise. Aside from its fibers, the growth is said to yield valuable gum, oil, balsam, pitch and acid.

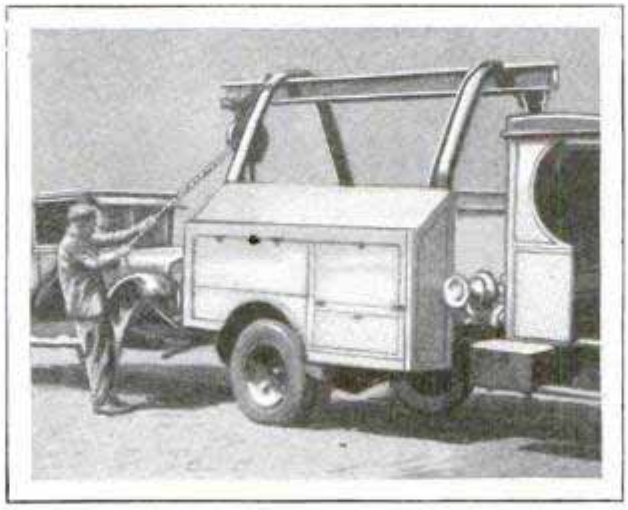
A Living Shelter for the "Old Oaken Bucket"; About 15,000 Plants Are Included in This Well-House Display

TINY HOUSE OF LIVING PLANTS POPULAR PARK DISPLAY

Containing about 15,000 live plants, a model well house is one of the attractive features of a park in Buffalo, N. Y. Inside is an "old oaken bucket" with roller and crank. The house is about twelve feet square and approximately the same height. Each supporting pillar for the roof contains nearly 1,200 plants.

WRECK CAR HAS A PLATFORM TO CARRY AUTOS

An automobile wreck car of unusual type is used by the street railways in Cleveland to haul away cars which are damaged on its tracks. Because an automobile, after a brush with a street car, seldom has all four wheels intact, the car is of the type which picks the victim up bodily and loads it on a low-slung platform. An unusual feature, however, is two large chests for ropes, jacks, blocks and other tackle, built over the rear-wheel fenders. The chests are supported through attachment to the inverted U-shaped supports of the overhead crane used in loading.

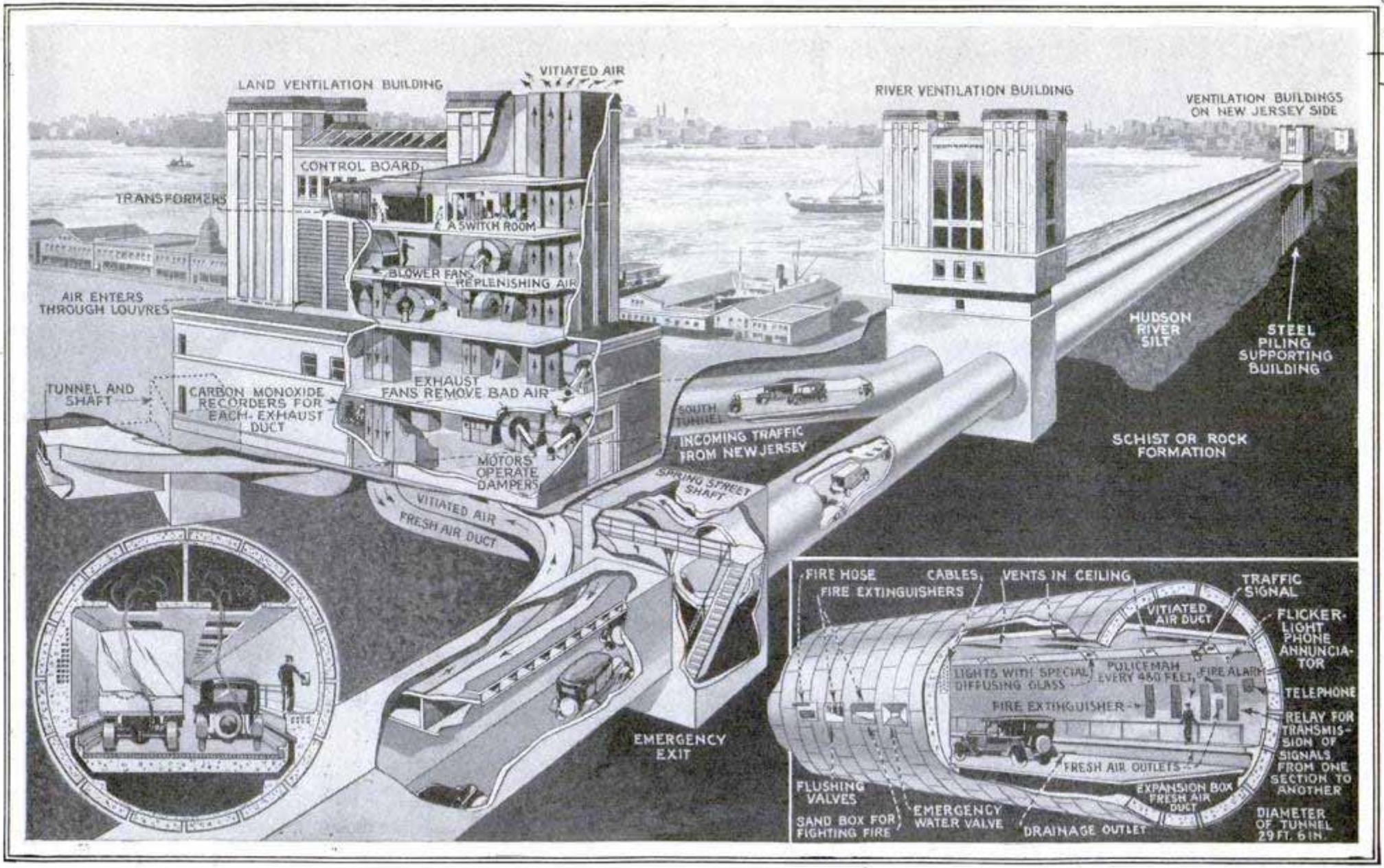


Wrecking Truck with Supply Cabinets Built Out over the Fenders of the Car.

WEIGHT OF WHALE'S BRAIN

According to preliminary tests conducted at the University of Southern California, the moist weight of the humpbacked whale's brain is about 4.4 pounds. This is interesting when compared with the weight of the average human brain and the relative bulk of a man and a whale. The range for the human brain is between forty-three and forty-eight ounces. The whale's brain is being kept for further studies.

3494



Diagrammatic Sketch of the Holland Vehicular Tunnel under the Hudson River, Showing the Twin Traffic Tubes, the Ventilating Arrangements, and the Huge Ventilator Buildings, Two of Which Are Located on the New York and Two on the New Jersey Shore

Interior of One of the Twin Tubes under the Hudson, Showing the Ventilation Ducts in the Ceiling, and the Sidewalk at the Side for the Police Who Regulate the Traffic

Auto Tunnel Is World's Newest Marvel

Vehicle Tubes under the Hudson Are Monument to Man Who Gave Life to Build Them

WHEN New York's and New Jersey's governors passed through the twin tubes of the Holland vehicle tunnel under the Hudson river recently, and then declared them open for their maximum capacity of 15,000,000 automobiles and trucks a year, they set the seal of approval on one of the greatest engineering feats of all time. And at the same time they dedicated a $48,000,000 memorial to the engineer who conceived and created the tunnels, and gave his life to the work, with the result that he died before it was completed.

The twin-vehicle tubes are unlike anything created before, because they have been built to handle vast streams of automobiles discharging into the air carbon-monoxide gas, one of the most deadly poisons known. A ventilating system had to be incorporated that would draw out the poison from the air, otherwise motorists would have slumped down and died at the wheel before they could have traversed the 9,250 feet of tunnel.

To force ventilating air through the nearly two miles of tunnel requires a man-made hurricane raging at seventy-two miles an hour. To turn such a blast loose among the autoists would have hurled cars into each other and piled up more wreckage than a tornado. So the engineers tamed it by sending the seventy-two-mile wind through a separate tunnel, beneath the roadway.

At intervals branch ducts carry the air to expansion chambers beside the curb, where it is expanded and slowed down until it is admitted into the vehicle tubes as a gentle wind, to be sucked out again, with its load of smoke and carbon monoxide, through return tubes at the top. Four huge ventilating buildings, two at the water's edge on either side and the others back near the entrance to the long approach drives, provide the air stream. They are fitted with automatic instruments which constantly check the poison content of the air throughout the tunnel length. Should the machinery fail for any

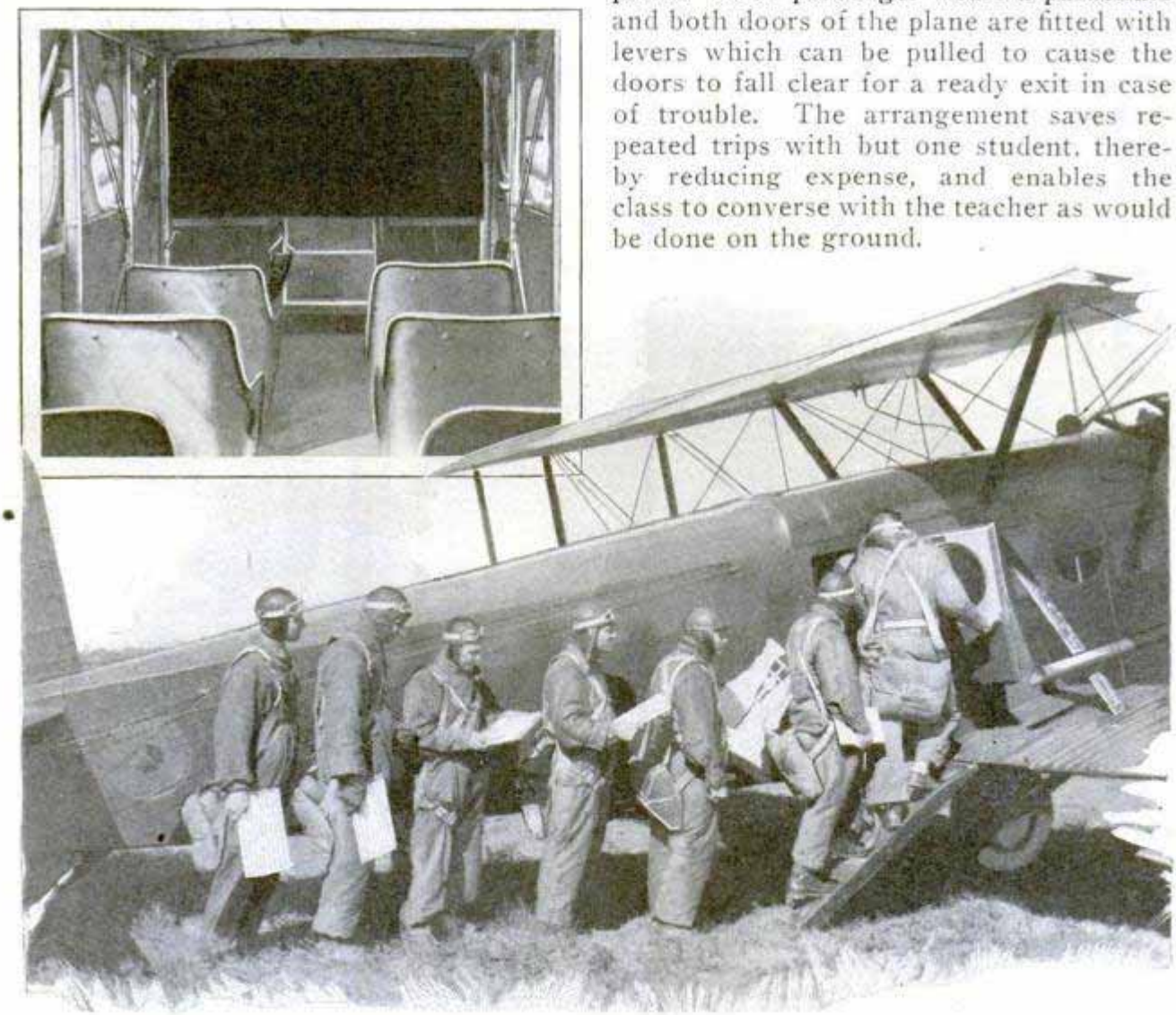
reason, the traffic lights throughout the tubes have been supplemented with extra warning signals which may be flashed on ordering drivers to stop their engines. A special force of 300 policemen has been trained for duty in the tubes.

Each of the tunnels, one for traffic from New York to New Jersey and the other for cars moving in the opposite direction, includes two traffic lanes, one for pleasure cars and the other for trucks. The speed limit will permit the former to traverse the tunnel in six minutes, as compared to much longer times for the river ferries, plus waits which may last an hour or more before a car can reach the ferry slip.

Clifford M. Holland, the tunnel designer, was only thirty-six years old, when, in 1919, he was selected to take charge of the work. The work on the tubes, with its worry and strain, and the bad effects of frequent trips to the high-pressure locks, where the diggers worked under compressed air, undermined his health, and he died in 1924. His chief associate, Milton H. Freeman, took over the task, and lived but six months. Only one of a half dozen engineers who were associated in the work at the start lived to see the tunnels finished.

GOING TO SCHOOL IN CLOUDS HELPS TRAIN AVIATORS

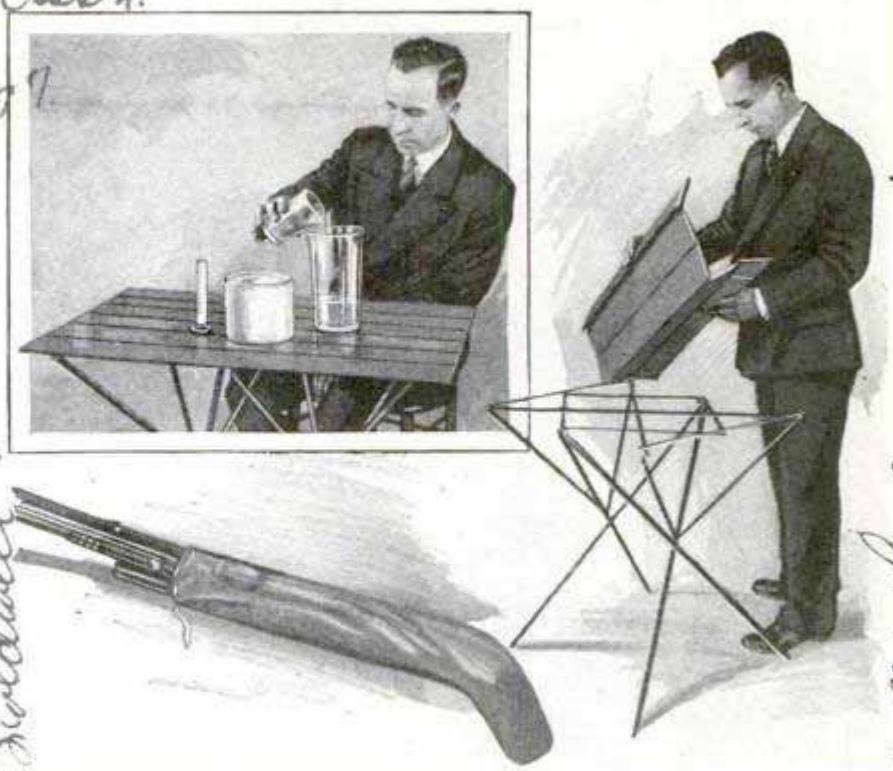
Candidates for army air officers' commissions go to school in the clouds at a midwestern flying field. A plane that holds six students, an instructor and pilot has been fitted with comfortable, padded chairs, a blackboard, and other equipment, and, while the ship sails along, the teacher gives lectures with the aid of the board and the class makes notes and reports. Each passenger wears a parachute and both doors of the plane are fitted with levers which can be pulled to cause the doors to fall clear for a ready exit in case of trouble. The arrangement saves repeated trips with but one student, thereby reducing expense, and enables the class to converse with the teacher as would be done on the ground.



View inside the Flying Schoolroom, and Students Going Aboard for a Lesson; Several Can Listen to the Teacher at Once, Saving the Expense of Numerous Separate Trips

BANK-VAULT DOOR OF PURE COPPER DEFIES TORCH

Tests with an oxyacetylene torch showed recently that two hours were required to penetrate a plate of pure copper, seven inches thick, intended for a bank vault. Engineers estimated that it would take a burglar about six hours to burn through one of twelve inch thickness. One of the chief reasons for this is that copper, being an excellent conductor of heat, is more difficult to raise to a high temperature under a torch so that, while the flame may penetrate the first few inches of the metal in a short time, a much longer period is required for the rest, as the plate tends to draw the heat away and thus lower the efficiency of the torch considerably.



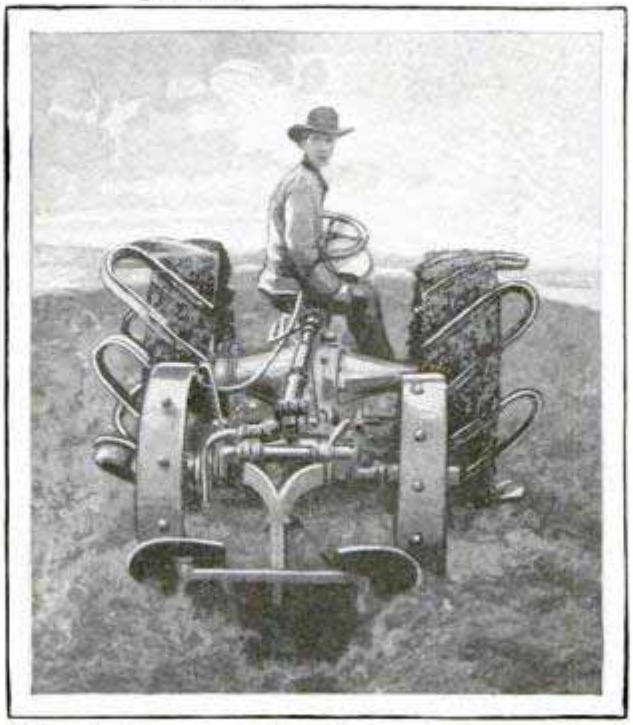
Folding Table Which Can Be Carried in Sack No Larger Than a Golf Bag, Yet Will Support a Heavy Load

FOLDING TABLE FITS INTO BAG FOR EASY CARRYING

A folding table, that goes, top and all, into a canvas sack about the size of a golf bag, has been produced by a Wisconsin manufacturer. A single motion opens the framework, as all the parts, with the exception of the two locking members beneath the top at either end, are permanently hinged. The folding top, covered with artificial leather, is equipped at the corners with coil springs that snap over the framework and hold it in place. The table weighs twelve pounds, stands twenty-seven inches high and the top measures twenty-two by thirty-four inches. It is strong enough to stand transportation and usage as a dinner table for camping.

LUGS FOR TRACTOR WHEELS HELP IT OVER MUD

The usefulness of the tractor, especially in mud and soft soils, has been increased by the application of sets of horseshoe-shaped lugs to the wheels to afford greater traction. They are especially serviceable in clearing land, passing through growths of underbrush and other difficult places where tractors ordinarily might become stalled. They are easily attached, and permit the use of the tractor on plowed and disked land.



Giving the Tractor Added Efficiency; Wheels Equipped with Special Lugs for Soft Soil

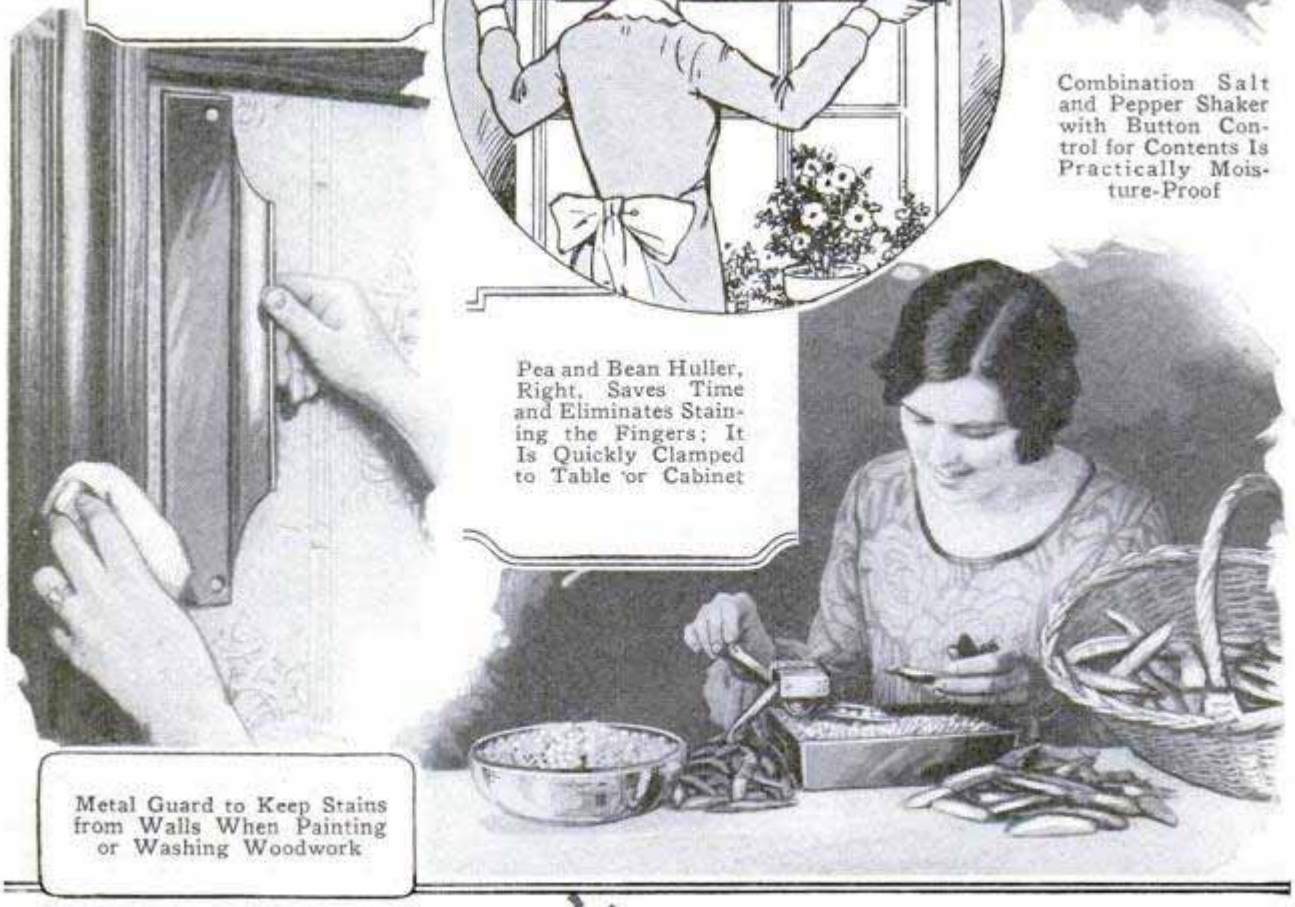
3091

To Save Work

To Keep the Fingers Away from the Wringer, the Washing Machine at Left Is Fitted with an Automatic Feeding Attachment; Above, an All-Rubber Dish Scraper That Won't Break, and Saves the Plates

At Right, a Convenient and Easily Adjusted Window Shelf for the Plants

Combination Salt and Pepper Shaker with Button Control for Contents Is Practically Moisture-Proof



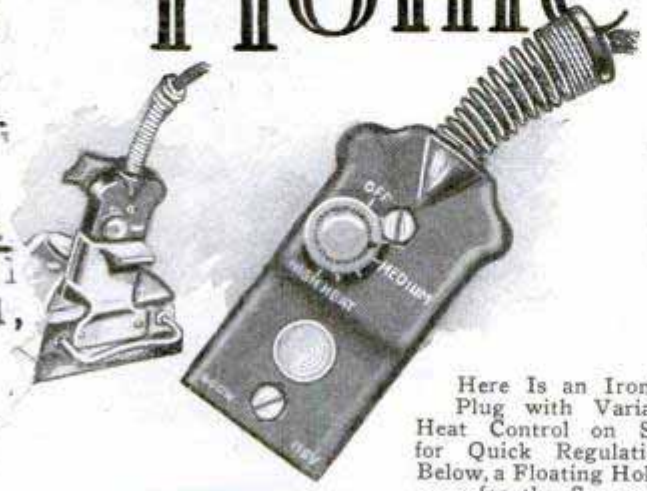
Pea and Bean Huller, Right, Saves Time and Eliminates Staining the Fingers; It Is Quickly Clamped to Table or Cabinet

Metal Guard to Keep Stains from Walls When Painting or Washing Woodwork

Материал, защищенный авторским правом

3091

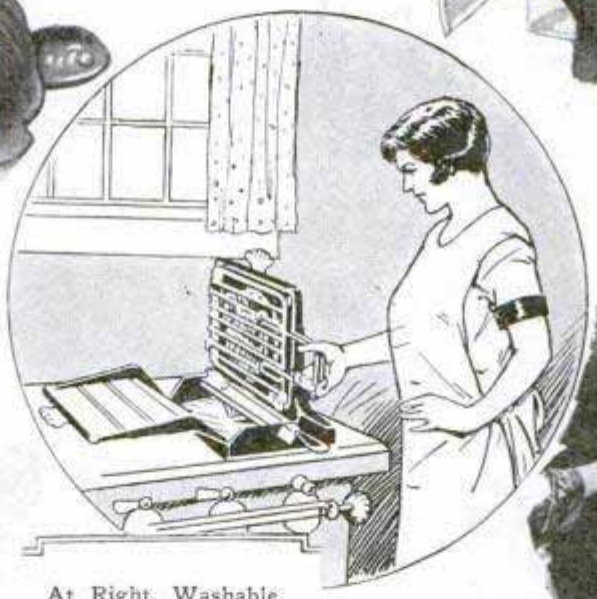
in Your Home



Here Is an Ironing Plug with Variable Heat Control on Side for Quick Regulation; Below, a Floating Holder for the Soap

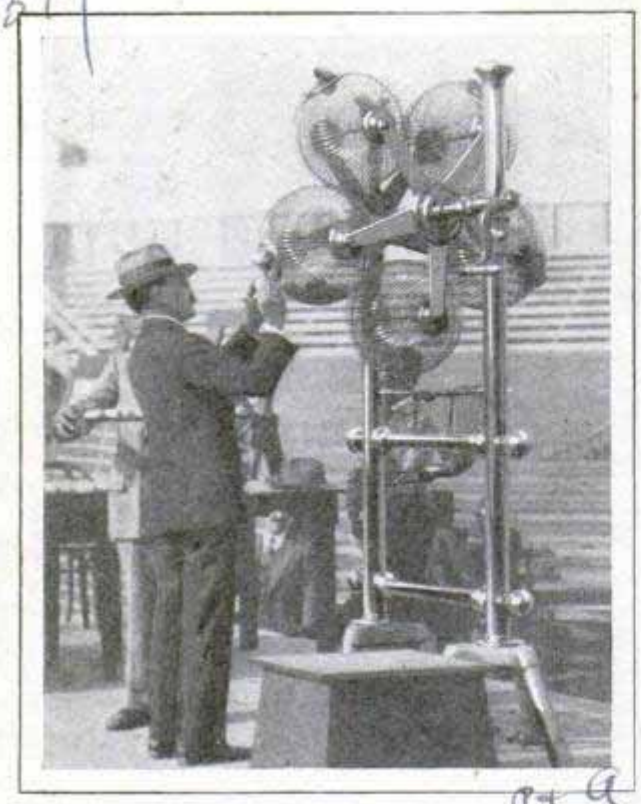
Saving Space and Hooks, Triple Towel Holder Can Also Be Used for Hanging Garments

Right, Handy Broiler for Steaks or Fowls Is Used on Top of Gas or Oil Stove, and Broils Both Sides of the Meat at One Time



At Right, Washable and Ventilated Laundry Bag of Mesh

Double Aluminum Cooker Has a Non-Meltable Bottom Which Eliminates the Necessity for Water in Either Upper or Lower Compartment; Vents Give Even Distribution of Heat and Several Articles May Be Prepared in the Cooker at One Time



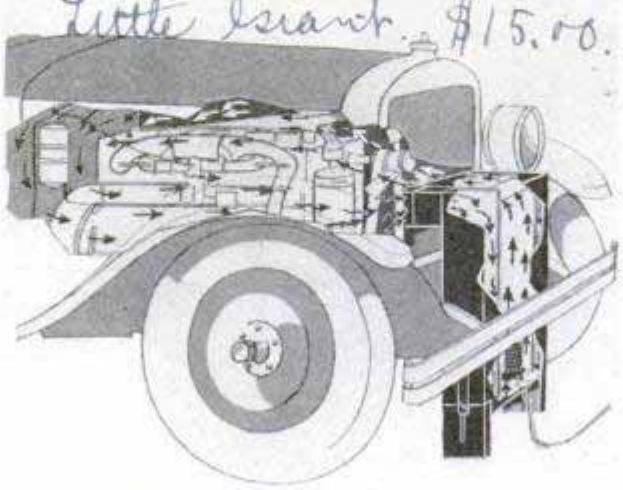
Shuffling the Tickets for the Road Lottery; the First Prize Was for $10,000

LOTTERY AIDS ROAD BUILDING IN LOWER CALIFORNIA

To raise funds for constructing better roads from Tia Juana into Lower California, Mexican officials resorted to a lottery. Lucky numbers were picked from tickets that had been sold, placed in an arrangement of whirling wire baskets and thoroughly shuffled. The first grand prize at one of the drawings was $10,000.

HEATER KEEPS MOTOR WARM IN COLD GARAGE

Operating on current from a lighting socket, a heating cabinet is said to be effective in keeping the automobile engine warm even if the garage is unheated and during the coldest weather. It is placed in front of the radiator and has chambers so arranged that, as the warm air enters, the cold air is driven out, causing a constant circulation to be maintained.



View Showing Heater Installed and Operation

ROLLER BEARINGS ON RAILWAYS HELP IMPROVE SERVICE

No more rest-disturbing jolts and jars for the railroad passenger! No more sudden starts and stops that spill his coffee in the diner and spoil the enjoyment of his meal. Lower operating costs, no more hot boxes, greater speed and generally improved performance for the railroads. These are some of the benefits claimed for roller bearings. More than 110 railroads are employing one type while upward of fifty roads are using another. Tests have shown that a heavy Pullman car, equipped with roller bearings, can be pushed by two men. Another demonstration proved that a twenty-one-car roller-bearing train could be started much more easily than one of twelve cars with the ordinary type of brass journals. Tremendous savings are being effected through the elimination of hot boxes and the reduction of the number of inspections necessary. One railroad estimates that a hot box on a passenger car in service costs on the average $30. The roller bearings need lubrication inspection only about once in every 25,000 miles. Lubricant in them has been found in good condition after running 30,000 miles. Several railroads are still gathering data concerning the results achieved by the bearings, but already interesting announcements have been made. For instance, the Chicago, Milwaukee and St. Paul railway found that during October, 1927, it cost but 9.8 cents per 1,000 car-miles to grease its "Pioneer Limited" after the adoption of roller bearings, while the cost of lubricating the train on plain bearings was between 22.5 and 26 cents per 1,000 car-miles. At a recent test, using a block and tackle and a dynamometer to measure the force applied, it was found that a roller-bearing car, although 755 pounds heavier, was started with but 267 pounds, while the plain-bearing car required 2,337 pounds to

start. On speed tests, the roller-bearing cars reached 10.54 miles per hour after twenty seconds, while the plain-bearing cars made but 8.75 miles per hour after the same length of time.

RADIO TELEPHONES ON LINER SERVE EVERY CABIN

Passengers on the "Cap Arcona," the new Hamburg-South American liner, may enjoy radio-telephone conversations with their friends while the ship is proceeding on its way, as there is a wireless telephone in each cabin. The installation is of sufficient power to maintain contact with radio stations on shore, for the boat is not far from land over the greater part of its route. Passengers may sit comfortably in their cabins while talking with persons at home, or they may call up anyone of their fellow voyagers.

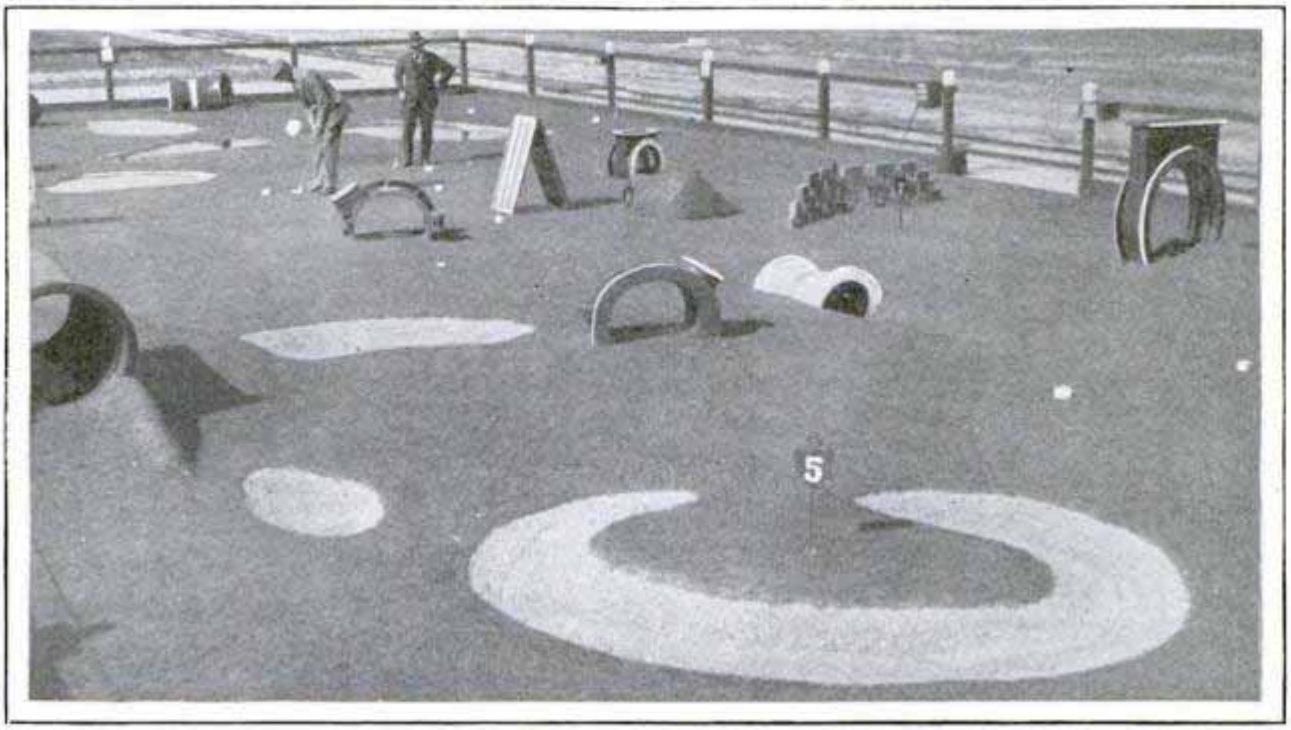
BROKEN TILE AS GOLF HAZARDS TEST PLAYERS' SKILL

Defective tiling, pipe and other articles usually consigned to the scrap heap, have been used on a small golf course in New York to afford the players unusual hazards. The course has nine holes and is arranged to give the greatest opportunity for skillful playing and unusual shots.

Capt. Holland with His Pet Ant Bear, One of a Tiny Species Found in Central America

ANT BEAR, SIZE OF A KITTEN, IS SHIP'S PET

Carrying a bear upon your shoulder might suggest a "strong man" act, but Capt. Charles J. Holland, of the Panama mail motorship "City of Panama," thinks nothing of this stunt, for his pet is one of the tiny species from Central America, an ant bear about the size of a kitten. It is tame and intelligent, its owner declares. One of the ship's passengers, on a recent voyage, brought back a bird with a beak like a pelican's and a crow's voice.



Broken Tile and Pipe form Hazards for This Small Golf Course on Private Grounds; the Shape of the Obstacles and Their Position Often Necessitate Especially Skillful Shots

Preparing Ice Cream at the Table; the Freezer Is Shown Open at the Left and in Operation at the Right

FIVE-MINUTE CREAM FREEZER USED ON TABLE

Freezing your ice cream at the table can be done in five minutes, it is asserted, with a German freezer recently introduced. It is attractively nickelplated and holds slightly more than twenty-six ounces. Ice and salt or nitrate of ammonia, washing soda and water may be used for freezing, the operation being similar to that required with the ordinary unit.

MUSKRAT FARMS IN SWAMPS YIELD BIG RETURNS

State reports from Maine show that the business of muskrat farming is becoming more important each year. In many localities, bogs and flats, otherwise useless, are being flooded to make ponds for raising the animals. This is done by building dams across streams that are not navigable, and, if the resulting lakes lie within the farmer's borders, the public cannot trespass. The activity is regarded as remunerative as fox farming.

SECRETS OF SOUND

Thunder generally cannot be heard at a distance of more than ten or twelve miles, but the sound of artillery is frequently audible more than 150 miles. To a high degree, the intensity of a sound depends upon the density of the air in which it is produced and not upon the density of the air in which it is heard. When many feet up, persons in a balloon can often hear sounds from below with remarkable clearness, but people on the ground cannot hear similar sounds from the balloon. During a thunderstorm, the air is generally in such a disturbed condition that the sound waves are likely to be dissipated. Gunfire is usually heard at great distances only when the air is extremely calm.

BRICK CLEANER AND SHAPER SAVES TIME AND WORK

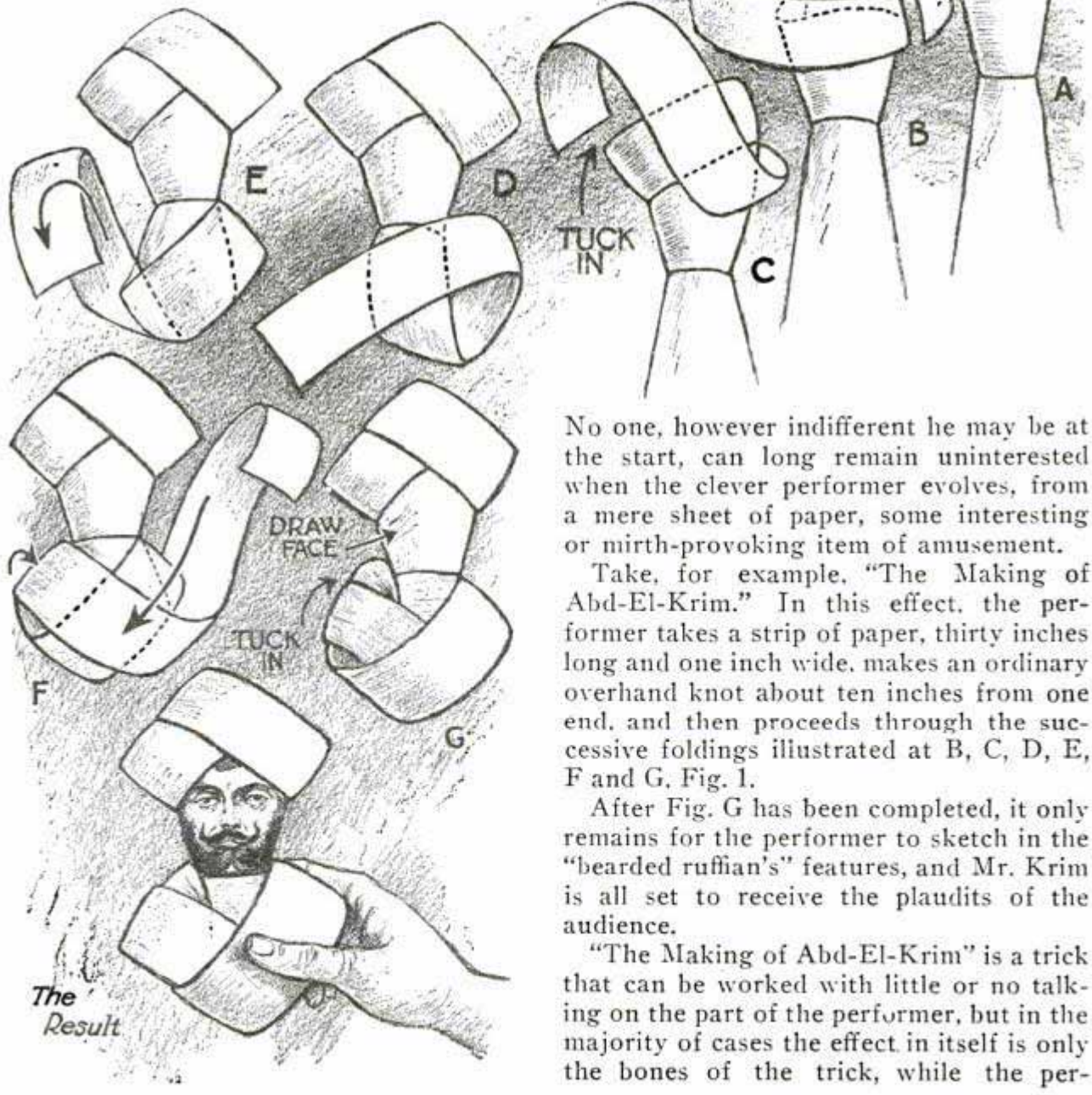
Three men can clean 3,000 nine-inch brick in a ten-hour day, according to claims for a rotor unit that removes the scale, clay and mortar and also shapes the brick. It consists of a rapidly revolving member that strikes 600,000 blows per minute, and the brick are handled in exactly the same manner as a piece of wood is planed or shaped on a wood joiner. The entire machine, including the motor, is mounted on a four-wheel truck so that it is readily portable.

Portable Brick Cleaner and Shaper in Operation; a Revolving Unit Knocks Off Scale and Mortar

TRICKS and TWISTS with PAPER

by Sam Brown

CURIOSITY killed the cat—but not paper tricks. Indeed, it is the healthy "what is it" development of the average person that has elevated paper tricks to its present place in the aristocracy of magic.



No one, however indifferent he may be at the start, can long remain uninterested when the clever performer evolves, from a mere sheet of paper, some interesting or mirth-provoking item of amusement.

Take, for example, "The Making of Abd-El-Krim." In this effect, the performer takes a strip of paper, thirty inches long and one inch wide, makes an ordinary overhand knot about ten inches from one end, and then proceeds through the successive foldings illustrated at B, C, D, E, F and G, Fig. 1.

After Fig. G has been completed, it only remains for the performer to sketch in the "bearded ruffian's" features, and Mr. Krim is all set to receive the plaudits of the audience.

"The Making of Abd-El-Krim" is a trick that can be worked with little or no talking on the part of the performer, but in the majority of cases the effect in itself is only the bones of the trick, while the per-

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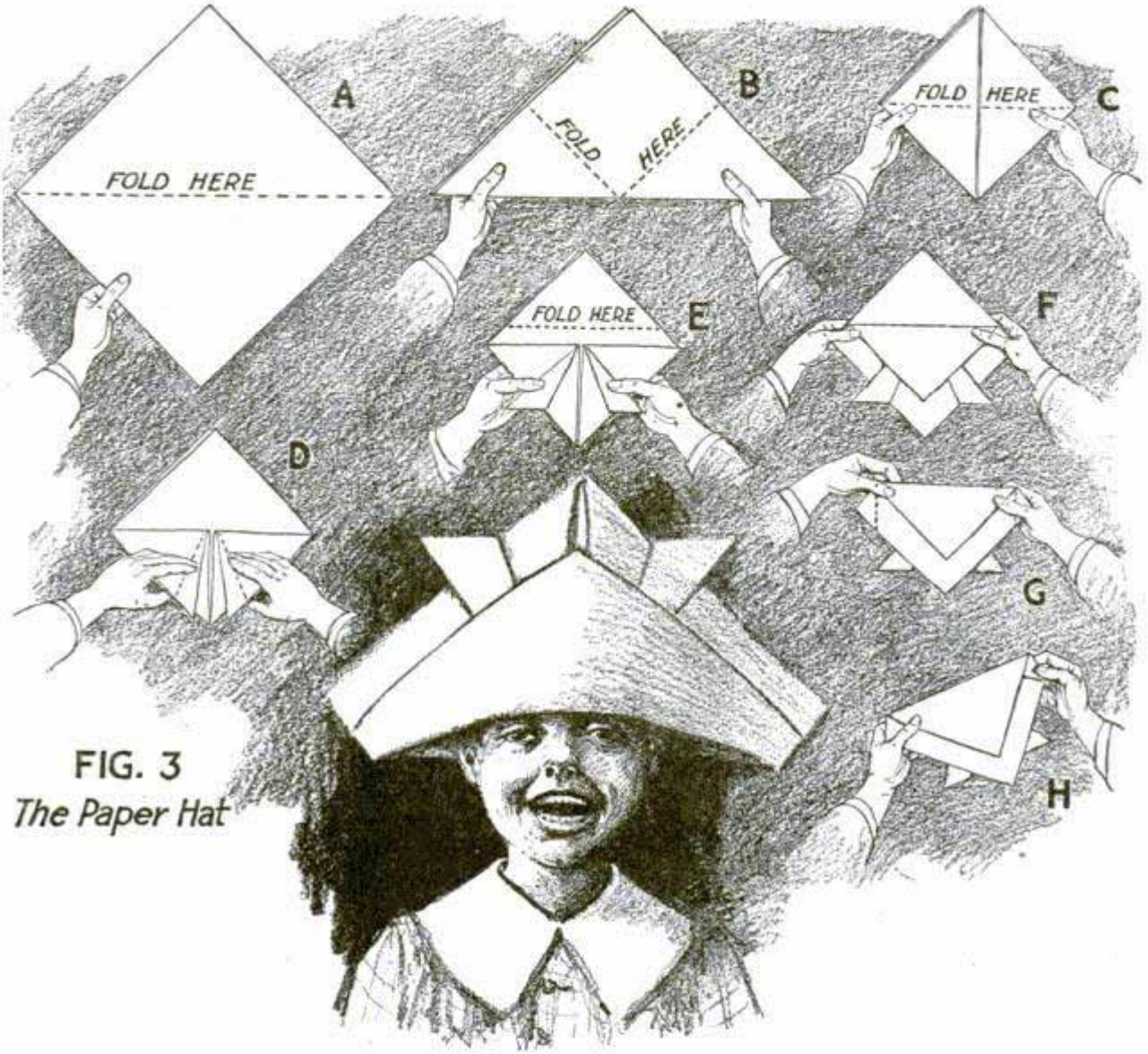

FIG. 3
The Paper Hat

former's "patter" supplies the entertaining value.

How many times has some youngster rushed up to you, all breathless, and demanded, "Make me a sojer's hat?" And could you do it? And ain't it the grand and glorious feeling when he burbles, "Say, this is a peach of a hat—this one's diff'rent!" Yes, sir!

The Chinese have given us the "diff'rent" hat. To make it, cut as large a square as possible from a sheet of newspaper. Fold this square from corner to corner to form A, Fig 3. Then fold A on the dotted lines as at B. Fold one side of B down on the dotted line to form C. Then fold the "wings" out as indicated by the dotted lines in C, forming D. Fold one part down on the dotted line to form E. Fold down the opposite side in a similar manner to form F. Fold the ends in, as indicated by the dotted lines in F, to produce G, and finally fold both sides of the hat down on the dotted line as shown at G, and the hat is complete.

A clever interlude, when exhibiting tricks with paper, is to juggle a sheet of newspaper on the tip of your nose. It may sound impossible, but if you take the diagonal corners of the sheet, one in each hand, as shown in Fig. 4, and stretch the paper tight, you will find this juggle a fairly simple matter.

Perhaps the one effect which has done more to popularize paper magic than anything else is the "Mariner's Wheel," and even today patterns based on this principle are pet effects among many magicians.

To make the wheel, take a sheet of paper—any size—and fold it as shown at A, B, C and D of Fig. 5. Then tear away the white portion, as shown at E. When the paper is unfolded—lo! the Mariner's Wheel.

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Another clever little conceit with paper that goes over big, is that illustrated in Fig. 6. Take a six-inch square of paper, A, and fold the corners to the center, as shown at B. Then turn the paper over and fold each corner to the center again, as in C. Color the dark portions in diagram D with red crayon. Fold the top edge of your sheet down to the lower edge, producing E.

You will find that you have four small pockets on the outside of your folded sheet. Each of these pockets may be opened by inserting the finger at the point to bend the outer flap outward and the inner walls inward. Then squeeze the four together by inserting the thumb and first three fingers into the pockets, forming F.

By alternately opening the pockets, which is done by spreading the fingers and thumb in alternate pairs, you can make the pockets change from red to white and back again in a manner that is most mysterious.

FIG. 5
The Mariner's Wheel

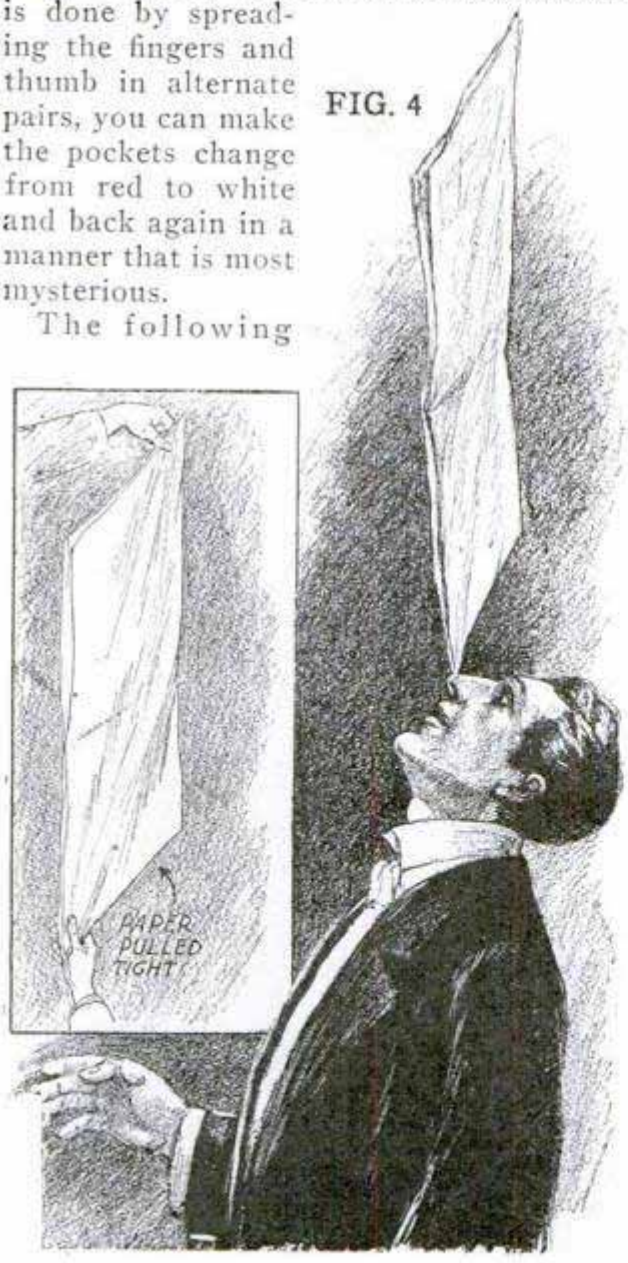


FIG. 4

The following trick has made quite a lot of money. Indeed, as a money maker it ranks with the age-old "Three-Shell Game" and "Three-card Monte."

But let me explain. The performer exhibits a folded sheet of paper. He opens this up and finds a second sheet, similarly folded. Opening this he reveals a third paper, and inside this a fourth. The performer requests a quarter from some unsuspecting member of his audience.

"Now," says the performer, addressing the donor of the quarter, "would you pay fifteen cents to see a good trick in magic?"

The spectator invariably nods his head. What else can he do?

The performer places the quarter in the inner paper and folds it up. The other papers are then folded, one at a time, until the package is complete. The performer blows gently on the paper. On opening the package, only a dime is found in the inner fold.

"Ah, quite right," murmurs the performer. "Here's your change."

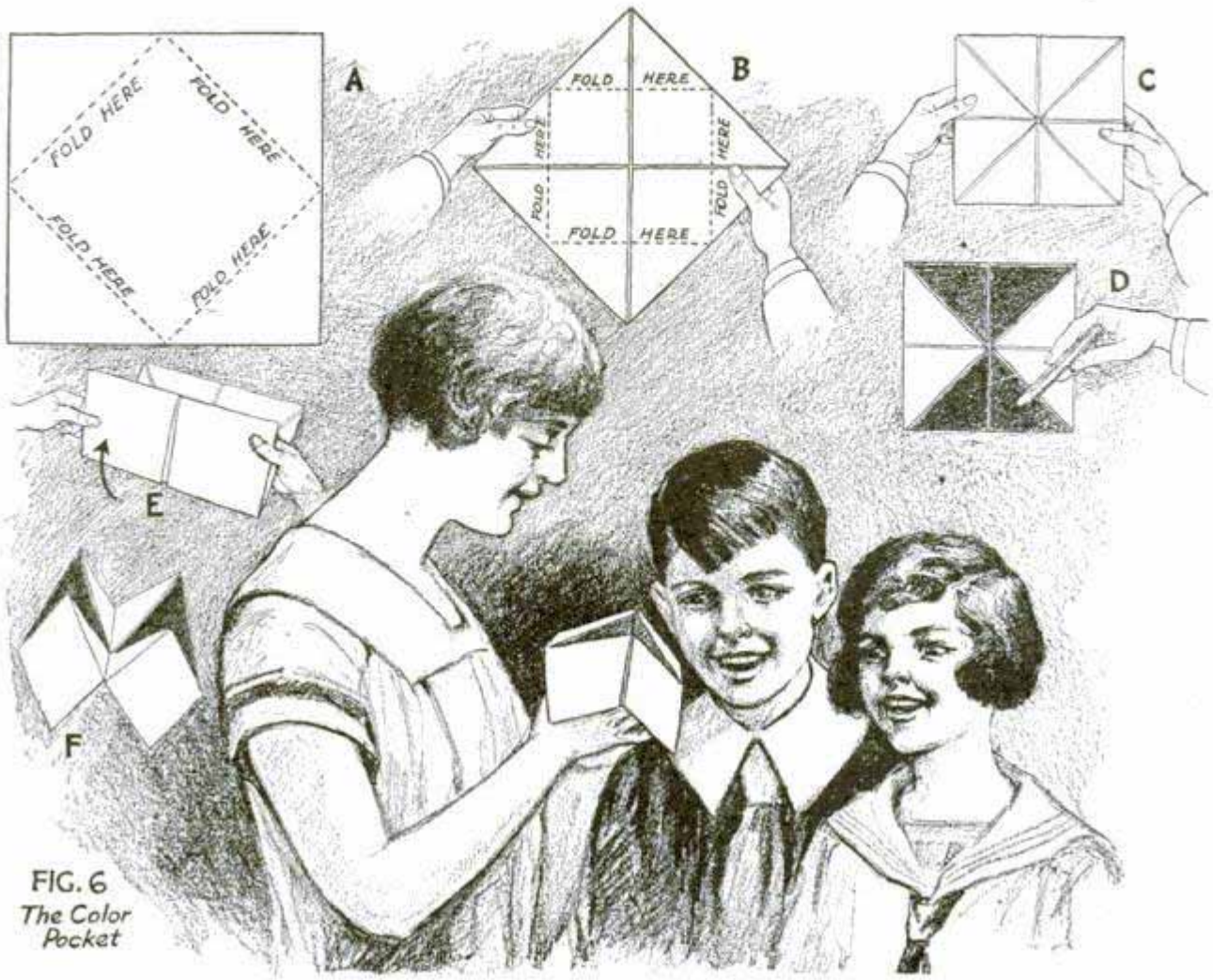
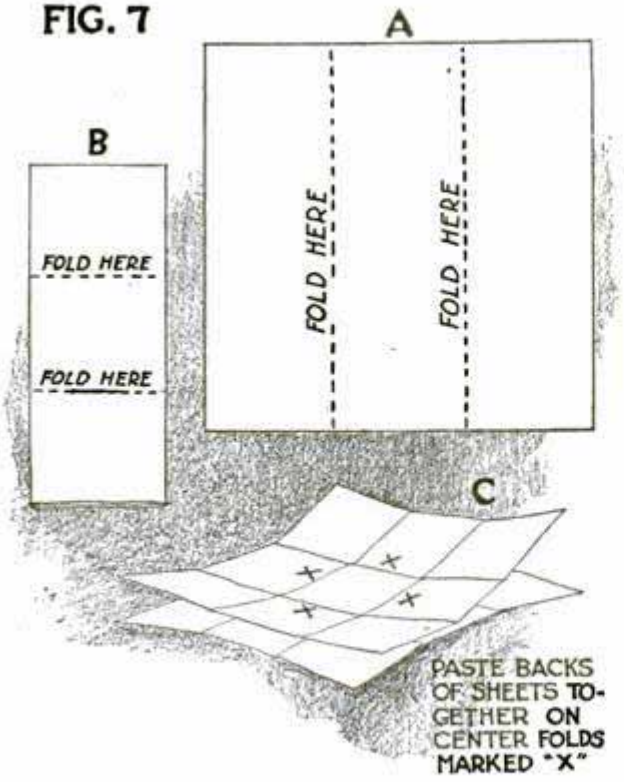


FIG. 6
The Color Pocket

FIG. 7



This effect requires a little preparation. Take a nine-inch square of very thin paper, and fold it in thirds, as shown by the dotted lines at A, Fig. 7. Then fold it in thirds the other way, as shown at B. Make a second sheet exactly like this one, and then paste the two sheets back to back at their center portions, as shown at C. If the work is carefully done, and the creases pressed tight, the two sheets should exactly coincide.

Inside each of these sheets place a smaller fold. Inclose the whole thing in a ten-inch square sheet which is folded in the same manner.

To prepare for the trick, place a dime in the inner fold of one of the sides, and place the packet of paper in your pocket. When ready for the trick, take the packet out, and place it on the table with the dime side down. Unfold the papers to the final fold and then ask for the quarter. Fold the quarter up in the small fold.

In folding the sheet, the right side is folded first, then the left side, then the fold nearest, and finally the fold farthest. The second sheet is folded in a similar

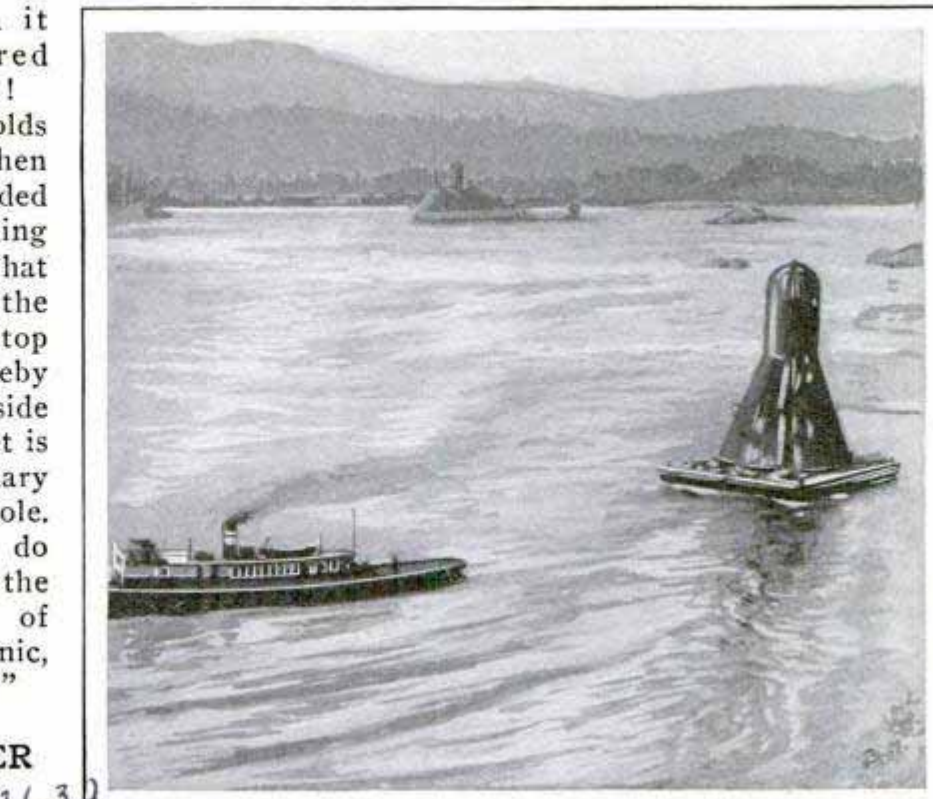
manner, but when it comes to the prepared sheet—there's the rub!

The right and left folds are made as before. Then the lower fold is folded up, but, instead of folding the top fold down, what you do is to fold the whole packet over on top of the top fold, thereby turning the quarter side down. The final sheet is folded in the ordinary way, covering the whole.

All that remains to do is the unfolding of the papers, the discovery of the dime, and the laconic, "Here's your change!"

PRESS OF FINGER BENDS BRICK

Bending a brick suggests the trick of a strong man, but almost anyone can do it, by simply pressing against the unit with his finger. This is shown by a remarkably sensitive instrument that the bureau of standards has devised for detecting slight strains in various materials used in industry, substances that appear to be perfectly rigid yet give under stress. The gauge indicates that pressing a brick with your finger bends it about one hundred-thousandth of an inch. This is determined by the amount of displacement of a bit of steel with a keen edge placed on the surface of the brick. The movement is measured by a special scale and a telescope. The gauge also reveals that a steel bar bends by its own weight if picked up by one end.



For Exacting Tests on Building and Other Materials; the Gauge That Shows a Brick Bends

Big Sawdust Burner Floating Down the Columbia River; It Weighed 60,000 Pounds, but Arrived without Mishap and Was Safely Set Up

SAWDUST BURNER TAKES A RIDE ON RIVER RAPIDS

The feat of transporting a large sawdust burner forty miles by water was accomplished recently on the Columbia river. It towered seventy-six feet above the stream, was fifty-two feet in diameter at the base and weighed 60,000 pounds. Engineers loaded it on two scows which were towed by boat. The trip was begun at the Cascade locks, so that, for some miles, the unwieldy load floated at high speed down the swift rapids, which are sometimes hazardous to navigation even with well-equipped boats. The burner was set up again without mishap.

To Attract the Eye of the Hungry Motorist; Plaster Hen and Chicks Advertising Inn Dinners

BIG PLASTER HEN SERVES AS AD FOR CHICKEN DINNERS

Tourists along an automobile road between Los Angeles and San Diego are attracted by a huge plaster hen and chicks on a box near the highway. The sign heralds the fact that chicken dinners are served at a restaurant near by.

QUIETLY RUNNING STREET CAR HAS FEATURES OF AUTO

Resembling, in many particulars, a closed automobile, a street car recently built for a mid-western city weighs considerably less than the usual type, is much quieter and is expected to effect savings in operating costs. Roller bearings, thin rubber layers between the wheel tires and center, and rubber cushions at the points of support of the springs are special features. As in an automobile, there are longitudinal springs, a pair on each side of the truck, and each of the four axles is equipped with differential gears, similar to those of an auto to permit the outside wheels to run faster than the inside in rounding curves, thereby giving more efficient and quieter operation. The sides and other parts of the car are constructed of duralumin. The unit weighs about 8,000 pounds less than the usual street car of its type.

GOLF NOW PLAYED AT NIGHT WITH LUMINOUS BALLS

Long, glowing streaks shining over a golf course in New York attracted the attention of evening strollers recently. The streaks were the paths of luminous balls which have been introduced so that the game can be played at night. The spheres were covered with a preparation of secret composition which held its light eight to ten minutes after the ball was exposed to air. Those that rolled into the grass were easily found.

SAWS RUN BY HAND OR MOTOR SIMPLIFY WOOD CUTTING

Portability and simplicity are combined in two saws German inventors have introduced to aid the woodsman and which are also adaptable to other purposes besides cutting trees. One is a wire-band unit that can be run by hand or by a small gasoline motor. The band revolves around a shaft which is operated by the engine or a hand crank and cuts logs of almost any size and to any degree of thinness. The other is a circular saw run by hand, intended for felling large trees. It is worked from a steel platform on wheels simply by moving a lever back and forth.

Demonstrating the Wire Band Saw and the Hand-Operated Saw for Felling Trees

Simple B-Eliminator for Direct Current

By HERMAN R. WALLIN

MANY homes and shops are located in districts supplied with direct current, and owners of radio receiving sets in such localities have heretofore been unable to use the standard B-eliminators designed for a.c. supply without going to the expense of installing costly converters.

The simple and compact device described in this article will enable the set owner to use the d.c. supply to eliminate B-batteries with little or no hum. The eliminator is made up of old parts and is quickly put together. The condensers used were taken from old Ford coils, obtainable from any Ford dealer or repair shop. If these are difficult to procure, use three 2-mfd. filter condensers of any good type. Six of the Ford condensers were used, wired in pairs to obtain sufficient capacity; purchased condensers of 2-mfd. capacity each would of course simplify matters but would cost considerably more. The entire eliminator, shown in Fig. 1, is only 4½ in. long by 2¾ in. high, and can almost be held in the palm of the hand. Owing to the compact construction, it may be tucked away in the cabinet of the receiver. After plugging into the 110-volt d.c. supply, it is merely necessary to adjust the detector voltage, which takes but a moment; no further adjustment is then necessary.

The choke coil is made from an old audio-transformer core. Two thin cardboard or fiber disks, 1¾ in. in diameter, retain the winding, which consists of a coil of No. 36 silk-enamel wire. The transformer core is separated and the disk slipped over one leg preparatory to winding. Leave a starting end, about 6 or 8 in. long, and continue the winding until it fills the spool to a diameter of 1½ in. The length of the coil is 1 in., and it is not necessary to wind it evenly, as the wire may be staggered or "random-wound," the main point being to fill the space allotted for it. After winding, the core is reassembled. The condensers are placed on top of each other, as shown in the sketch, and tied together with strong cotton thread; the entire unit may then be dipped in melted paraffin. This dipping is not absolutely necessary but is advised; if standard filter condensers are used, dipping is unnecessary. The condenser unit is mounted on a board, 4½ in. square, in the position shown in the illustration, and held in place by one or two strips of tin, ½ in. wide. The choke coil is now mounted on the base and held in position by four small metal brackets. The

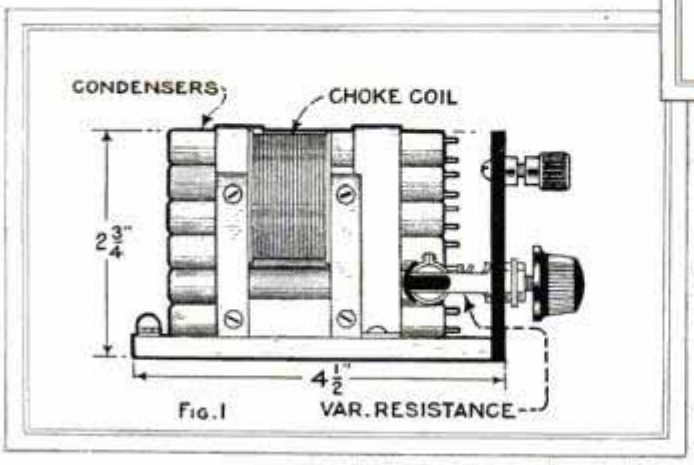


Fig. 1

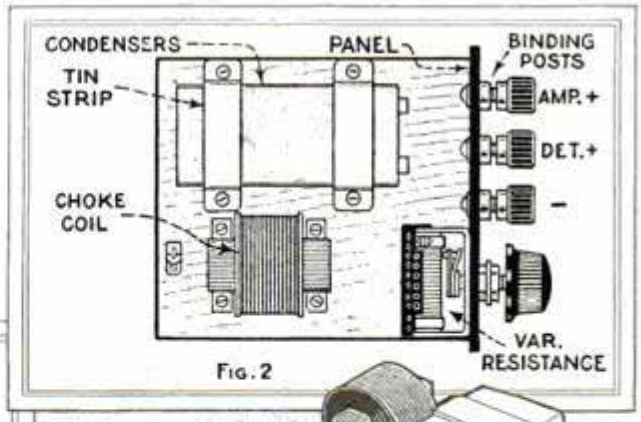
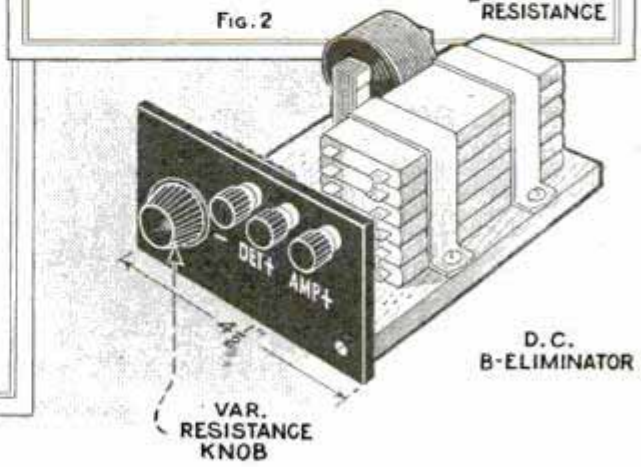
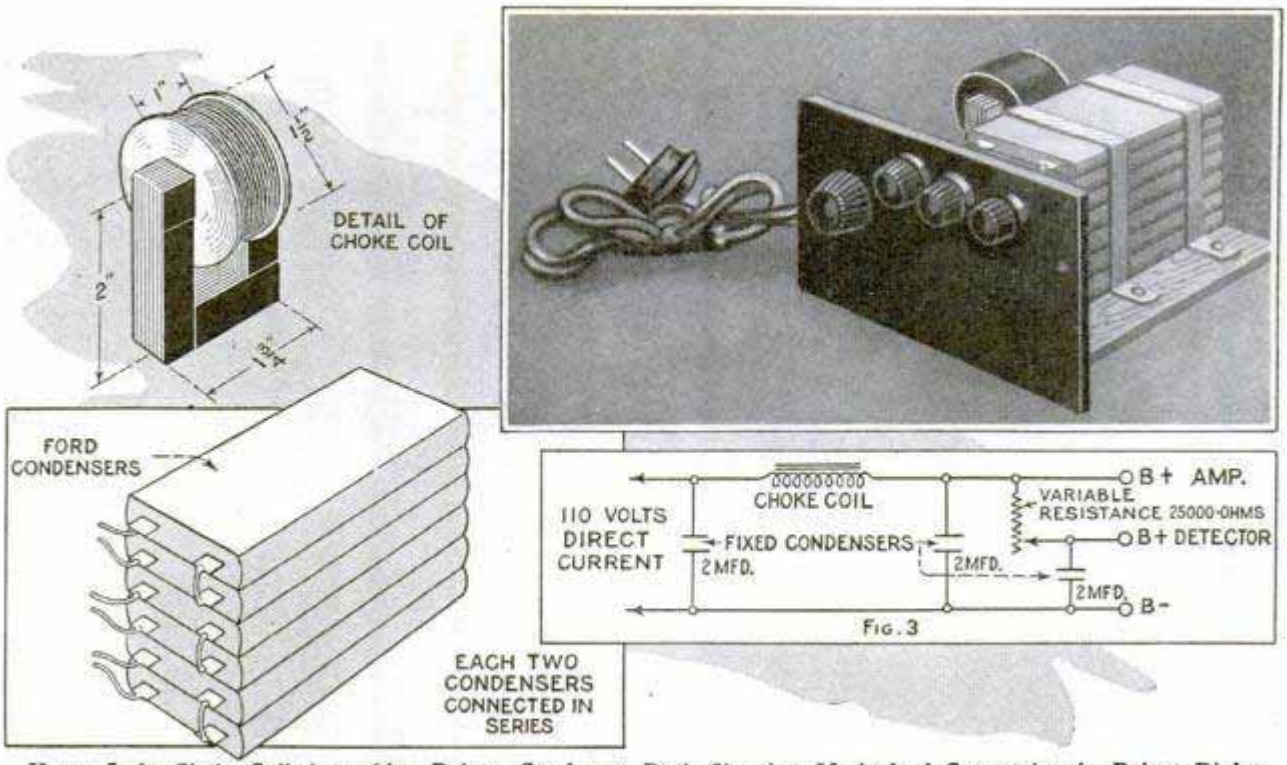


Fig. 2



Left, Side View of Assembly; Above, Instrument Layout; Below, Front View Showing Controls



Upper Left, Choke-Coil Assembly; Below, Condenser Pack Showing Method of Connecting in Pairs; Right, Schematic Diagram of Connections and Photo of Finished Unit

front panel in the original model consists of a piece of bakelite, 2¾ by 4½ in., although this and the baseboard may be any size the builder wishes. The three binding posts and the variable resistance are mounted on the bakelite panel, and the panel is then screwed to the baseboard. The variable resistance should be 25,000 ohms and is used to adjust the detector voltage.

The wiring is very simple, the start and finish turns of the choke coil being brought down on the base to two small Fahnestock clips, to make a neat and easy job. It is a good idea to place a fuse (any standard fuse block will do) in the 110-volt d.c. line, connected in one side of the input supply line. Two Fahnestock clips, one of which is shown at the rear of the incompleted assembly in Fig. 2, are the connections for the supply line. The wiring diagram is given in Fig. 3. One pair of condensers is connected across the input line; the choke coil is in series with one side of the line; another pair of condensers is wired across the line beyond the choke, and a third pair connected across the contact arm of the variable resistance and the negative B-post on the panel. The other side of the resistance is connected to the B-amplifier binding post. The B-positive detector binding post is then connected to the contact arm of the variable resistance, completing the unit.

When using an eliminator of this type, a small fixed condenser of .001 or .002 mfd. should be connected in series with the regular ground lead and ground binding post of the receiving set; in case the 110-volt d.c. line is grounded outside the house this condenser will prevent any damage to the receiver. The eliminator may be housed in a wooden or metal box, if desired, or may be used open, as shown in the photo. The lampcord is connected through the fuse to the Fahnestock clips at the rear of the assembly and terminates in a socket plug, the length of the cord, of

MATERIAL LIST

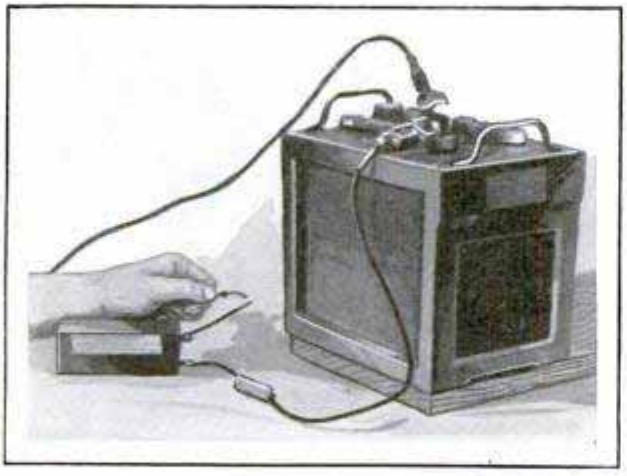
1 board, ½ by 4½ by 4½ in.
1 bakelite panel, 3-16 by 2¾ by 4½ in.
1 core from old a.f. transformer.
6 condensers, taken from old Ford coils, or 3 filter condensers, 2 mfd. each.
1 25,000-ohm Truvolt, Bradleyohm or Clarostat.
3 binding posts.
4 Fahnestock clips.
1 fuse block.
¼ lb. No. 36 silk-enamel wire.
Lampcord, brackets, tin strips and rubber-covered hookup wire.

course, depending on the requirements of the builder. The eliminator provides a maximum output of from 95 to 100 volts; if more voltage is required, it is necessary to connect regular B-battery blocks in series with it.

A blueprint showing the point-to-point simplified wiring diagram and layout has been prepared, and may be obtained from Popular Mechanics radio department, 200 E. Ontario st., for 25 cents, to cover cost and mailing. Specify blueprint No. 127.

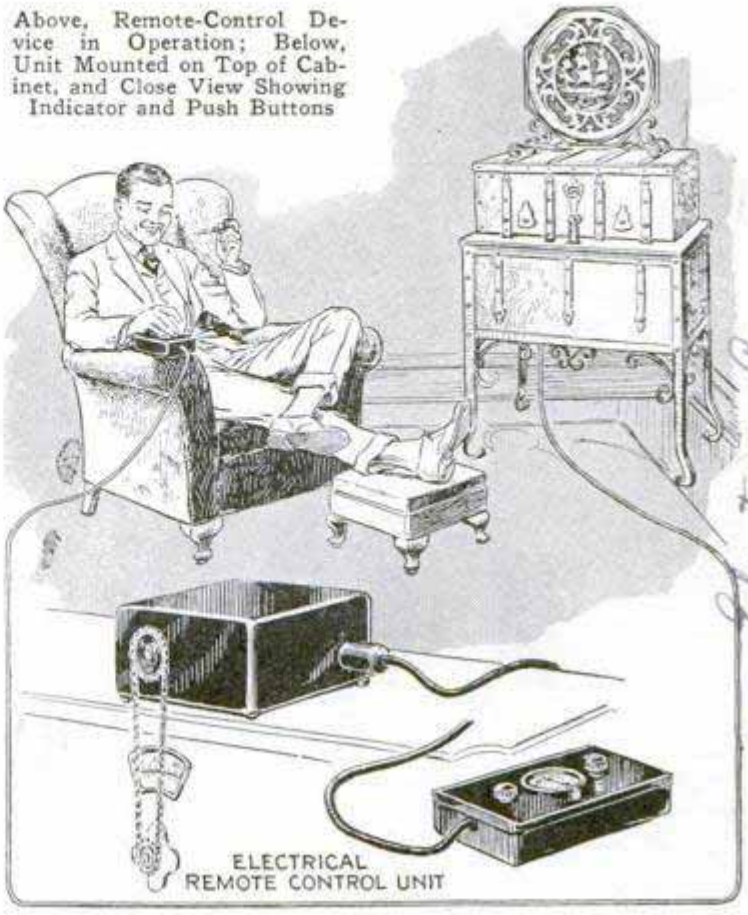
Salvaging a Shorted Condenser

With the large number of home-made B-eliminators employing high-capacity by-pass condensers, the tin-block type has come into general use. Some of these older types were not as rugged as they should have been, with the result that they were often shorted. In many cases such short circuits may be broken down by the application of high-amperage current from a storage battery. The short is caused by adjacent tinfoil sheets touching and allowing current to pass. As the high-amperage current from the storage battery is flashed across such a condenser, the contact is often burned out by the tinfoil melting at the point of contact. If the foil is melted far enough back, the condenser may again be put in service.—R. Wailes, Washington, D. C.



Applying Storage-Battery Output across Condenser That Has Become Short-Circuited

Above, Remote-Control Device in Operation; Below, Unit Mounted on Top of Cabinet, and Close View Showing Indicator and Push Buttons



Remote-Control Radio-Tuning Unit

The new remote-control device shown in the illustration enables the set owner to install his receiver where he chooses and operate it from his easy-chair, and invalids can control the set without help—another advantage. The device turns a receiver on or off, tunes from one station to another and regulates volume. Two models were shown at the New York radio show, one a mechanical unit which controls the set within the radius of a 6-ft. flexible rotating cable. The electrical unit permits the set to be installed anywhere—living room, attic or closet—and controls the set from any room in the house. If desired, every room in the house can be wired with outlets for plugging in both remote-control unit and loud speaker. The device is designed for use with any set of the single-dial type, the dial being removed and an adapter plate substituted, which requires no tools. It may be installed on top or at either end of the cabinet, or within a console. The control unit employs an indicator calibrated in the same manner as the dial in the set, the needle being deflected right or left by pressing

buttons. A small motor in the device at the set supplies the power for turning the condenser shaft, and relays operate the filament switching device.

Connecting the Light-Socket Aerial

The light-socket aerial shown in the diagram is one of the newer types. Screwed into any electric lamp socket, it takes the place of an unsightly and often inefficient

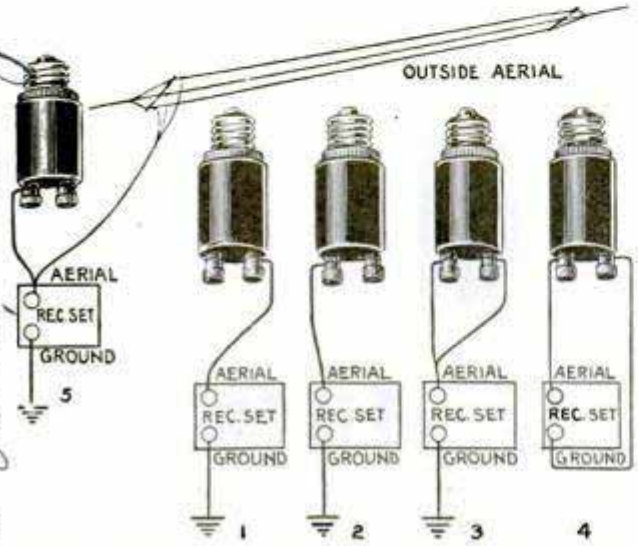


Diagram Showing Various Ways of Connecting Light-Socket Aerial for Best Results

outdoor aerial. It is also said to eliminate lightning hazards and make arresters and ground switches unnecessary. It operates efficiently on a.c. or d.c. lighting circuits, supplied by either the central station or from farm-lighting equipment. When once installed, the aerial needs no further attention, and no current is consumed. After connecting to light socket or base plug, the current is turned on. No precautions need be taken against either electric shock or short circuits as the device is fully insulated. It is said also to sharpen the tuning of the set, but as local conditions often affect reception, it may be necessary to try each of the five circuits given to find the one that gives maximum results. The connections should be tried in the order given in the diagram.

Curing Speaker Noises

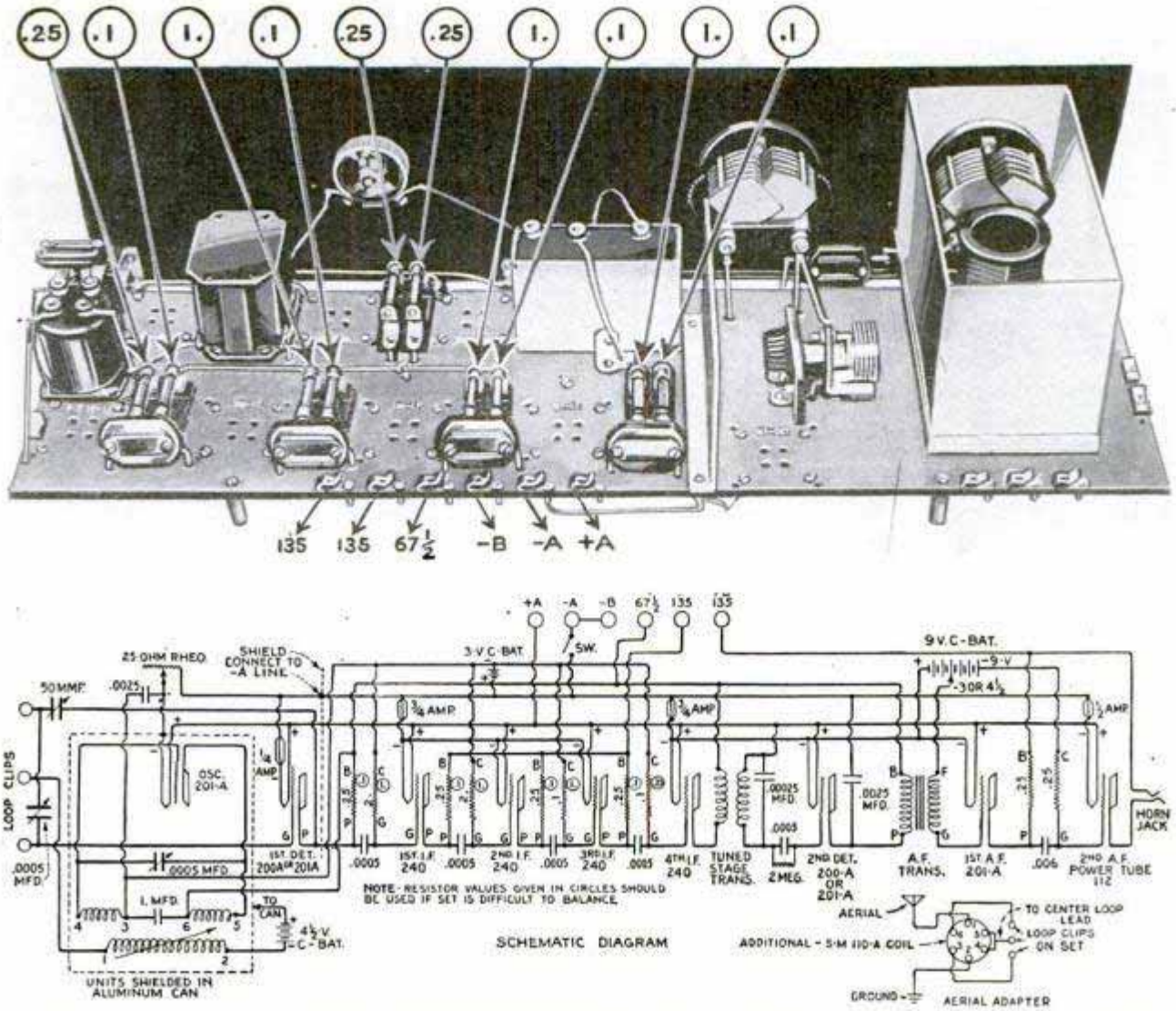
Speaker noises may be due to a number of conditions, which are often difficult to locate, but usually will be found in a tube. Detector tubes are the chief offenders. The cause of the microphonic noises lies in the fact that the elements are not securely anchored. Shipping will often jar one or more of them and permit them to vibrate. Operating loud speakers on, or near, the set will often cause this vibration. The remedy most easily applied is to mount the entire set on sponge-rubber pads, and keep the speaker some distance from it. Most of the set designers now employ spring-suspended sockets for the r.f. and detector sockets to eliminate this trouble. Fractured, or poorly soldered, connections will also cause these noises as well as materially interfere with reception. A loose or broken connection is easily remedied by the application of a hot iron, as there is usually enough solder at the point to make a good connection and a touch with the iron will put the set in good order.

Clock Starts and Stops Radio Set

Connected in the A-battery circuit of the receiver, a clock-operated switch can be set to shut off or turn on the current at predetermined hours. Of course, as the device only controls the A-battery current, if the set is equipped with a B-eliminator, it will be necessary to provide an automatic switch, operated by the A-battery current, in this circuit.

Cone Speaker Mounted in Tip Table

The combination tip table and speaker shown in the illustration is useful in that it is a convenient smokers' stand as well as an effective means of hiding a loud speaker. The cone is mounted just below the top and sound issues from holes in the sides. The table top acts as a sounding or baffle board, and the speaker is so mounted as to utilize the entire wooden casing.

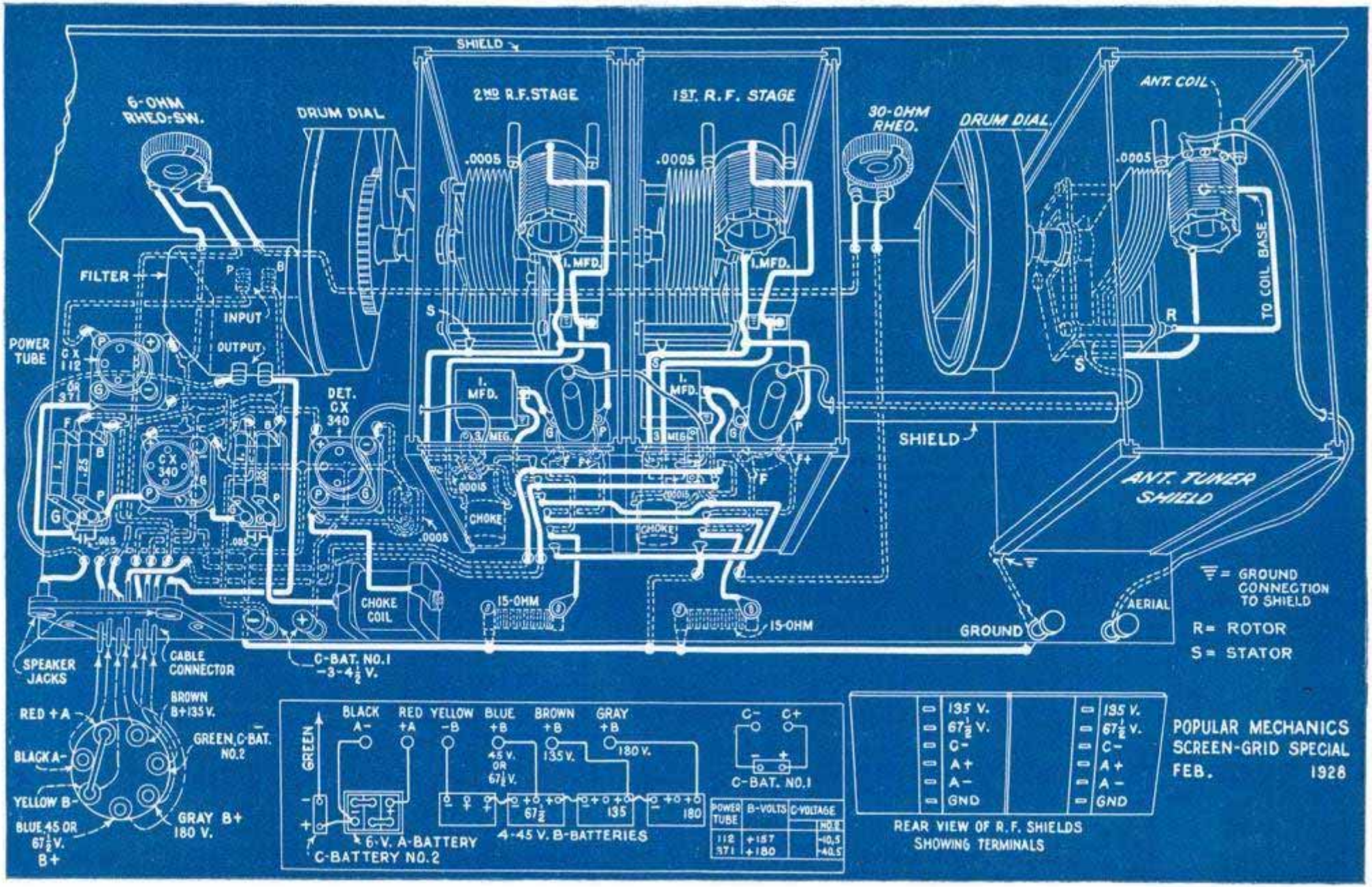


Above, Rear View of Completed Set, Showing Suggested Resistor Values to Simplify Balancing; Below, Schematic Diagram Showing the Same Resistor Values, Indicated in the Small Circles

Balancing the "Economy Nine" Superhet

The Popular Mechanics Economy Nine, described in the Nov., 1927, issue, and featured at the New York and Chicago radio shows, has proved to be one of the most efficient and interesting sets developed in the past year. A very close check on its performance in the hands of the average builder is kept for the purpose of insuring maximum results under all conditions. A number of readers report reception of west-coast stations from eastern states, in spite of unfavorable weather conditions, immediately after completing the set; others comment on the ease of building, sharp tuning and excellent tone. Balancing the set seems to be the only difficulty that any of our readers have encountered. A laboratory check on one or two of these cases revealed the fact that the resistors used were not actually of the values for which they were marked, and, of course, a variation in the value of any particular resistor threw the set out of balance. One or two other builders did not use the parts specified, and this also led to trouble, since any variation in this respect naturally would produce entirely different results.

The resistor combination shown in the accompanying illustration is less critical than the one previously specified and a random selection of various makes, marked for the values given above the photo, proved perfectly stable in all cases. If it is found necessary to change the resistors you are now using, be sure to disconnect the A and B-batteries before making the change, so as to protect the tubes from an accidental short circuit. Back copies of the November issue, also large blueprints of the wiring diagram and full-size drilling templates are available for our readers.


SHIELD
6-OHM RHEO. SW.
DRUM DIAL
2ND R.F. STAGE
1ST. R.F. STAGE
30-OHM RHEO.
DRUM DIAL
ANT. COIL
.0005
.0005
.0005
TO COIL BASE
FILTER
INPUT
OUTPUT
POWER TUBE
GX 112 OR 371
GX 340
DET. GX 340
1 MFD.
1 MFD.
1 MFD.
1 MFD.
3 MEG.
3 MEG.
.0001
.0001
CHOKE
CHOKE
CHOKE COIL
.005
.005
.005
15-OHM
15-OHM
SHIELD
ANT. TUNER SHIELD
GROUND
AERIAL
= GROUND CONNECTION TO SHIELD
R= ROTOR
S= STATOR
SPEAKER JACKS
CABLE CONNECTOR
C-BAT. NO.1 -3-4½ V.
RED +A
BROWN B+135 V.
GREEN, C-BAT. NO.2
BLACK A-
YELLOW B-
BLUE 45 OR 67½ V. B+
GRAY B+ 180 V.
BLACK A-
RED +A
YELLOW -B
BLUE +B
BROWN +B
GRAY +B
GREEN
45 V. OR 67½ V.
135 V.
180 V.
6-V. A-BATTERY
4-45 V. B-BATTERIES
C-BATTERY NO.2
C- C+
C-BAT. NO.1
POWER TUBE
B-VOLTS
C-VOLTAGE
NO.2
112
371
+157
+180
-10.5
-40.5
135 V.
67½ V.
C-
A+
A-
GND
135 V.
67½ V.
C-
A+
A-
GND
REAR VIEW OF R.F. SHIELDS SHOWING TERMINALS
POPULAR MECHANICS SCREEN-GRID SPECIAL FEB. 1928

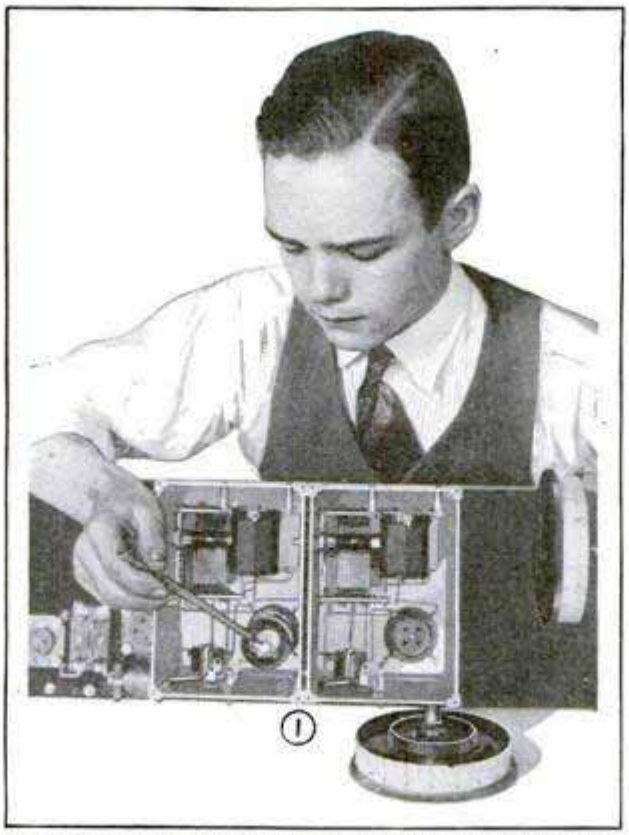
POPULAR MECHANICS

SCREEN-GRID SPECIAL

By Frank L. Brittin

ONE of the most interesting developments in radio receiving is the new screen-grid tube. This tube is intended primarily for r.f. amplification and requires neither neutralization nor stabilizing resistance. The voltage-amplification factor of the tube is said to be over 250, which makes possible an actual voltage amplification of from 20 to 40 per stage, depending on circuit losses. When compared with the usual 4 to 6 per stage of the general-purpose tube, this is a real advantage, as it makes possible the building up of very weak signals from distant stations to a point where detection and audio amplification are simple matters. Engineers have been striving for several years to develop greater amplification in the r.f. stages, and the superheterodyne circuit was one of the most successful methods of obtaining such amplification. The real solution, of course, lies in the better tube and circuit design, reducing losses to a minimum. It must be remembered that, although these new tubes give greater r.f. amplification per tube than former types, a certain number of tuned stages must be used under present-day broadcasting conditions to obtain the necessary selectivity.

The new tubes will not necessarily reduce the number of tubes required in a given circuit, and they cannot be utilized in present standard receivers. Special circuits and specially designed shielding are required to obtain maximum results. The new tube, known as the UX-222 or CX-322, has a filament, a plate and two grids, instead of the three elements employed in the standard tube. The base is of the four-prong type and the tube differs in external appearance from the ordinary tube only in the addition of a small metal cap (indicated in photo 1) at the top, for a fifth connection to the control grid. The filament voltage for the tube is 3.3, and



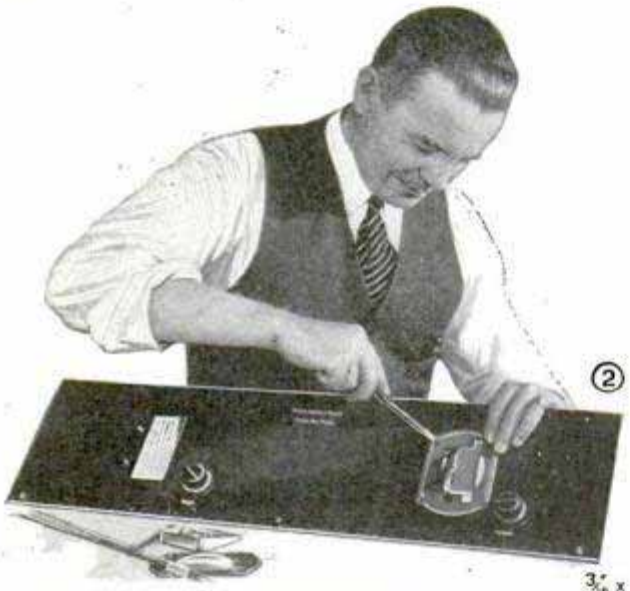
Position of Screen-Grid Tube in Shielded Radio-Frequency Stages

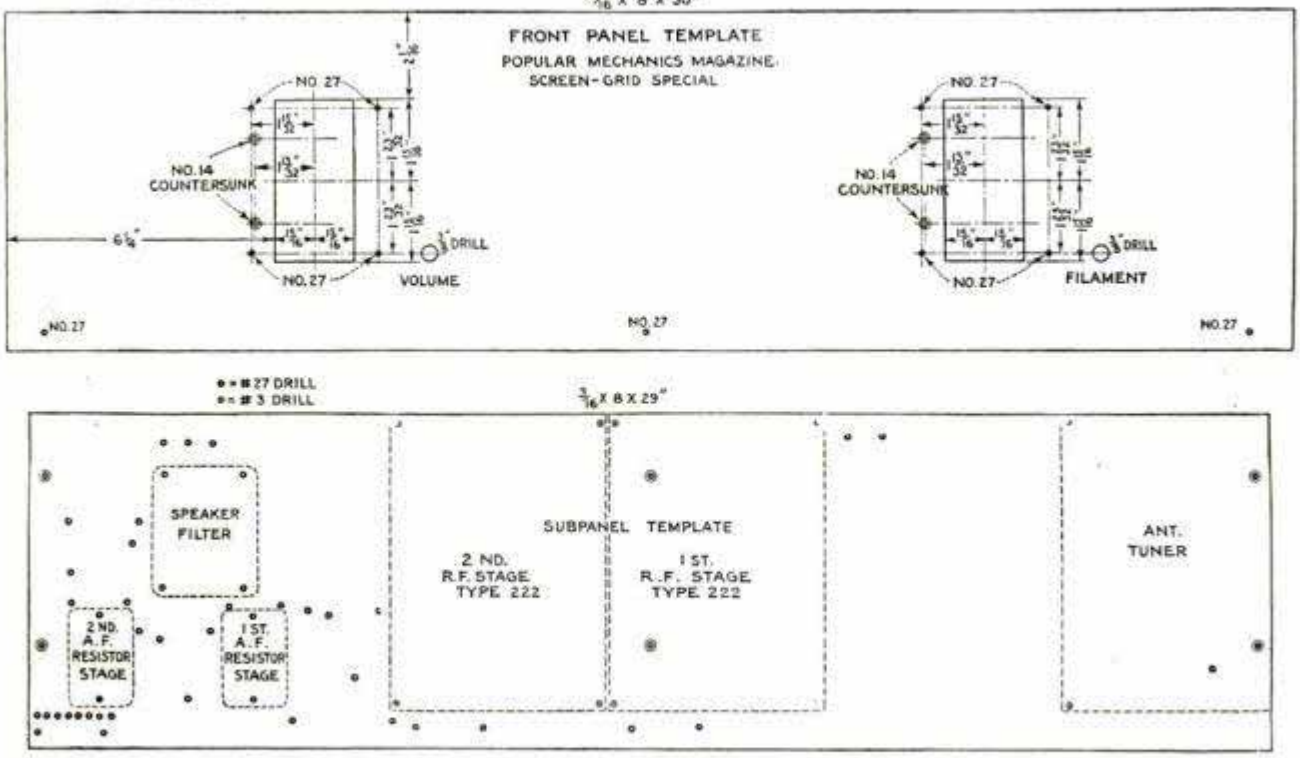
the filament-current consumption is .132 amp. Filament resistors make it usable with a 6-volt storage battery, and the recommended B-voltage is 135 volts.

The full high-amplification possibilities of the tube will no doubt be obtained when it is applied to the superheterodyne circuit in the intermediate stages, but the results obtained with the receiver illustrated and described in this article were highly satisfactory. The first try-out was on silent night in Chicago and resulted in the logging of thirty-two distant stations in a little less than two hours. The volume on these distant stations was even greater than one would expect from locals in the city, on a standard multi-tube set. The a.f. stages of the set are resistance-coupled, of latest design, and the tone quality is excellent.

A complete set of full-size drilling templates and large blueprints of the wiring diagrams make construction very simple. The panel layout is shown on this page, and the assembly is started with the front panel, as shown in photo 2. The knob at the right controls the 6-ohm combination rheostat and filament switch, and the one at the left the 30-ohm rheostat used as a volume control. The escutcheons for the drum dials are mounted on the front panel by means of four small machine screws supplied with the dials.

Photos 5, 8, 9 and 10 show various steps in assembling the instruments; photo 5 how the drum dial of the aerial tuning stage is mounted on the shaft of the condenser, and 8, the position of the aerial tuning coil, which is mounted on the front panel of the tuner-stage shield. The three shielded stages are obtainable either in knocked-down form or completely assembled and wired. The r.f. stages are mounted near the center of the subpanel, as shown in photo 6. The interior construction of the aerial tuning stage is shown in photo 10, in which the rear and side panels of the shield have been re-





Drilling Templates, Showing Location of Various Instruments on Front and Subpanels

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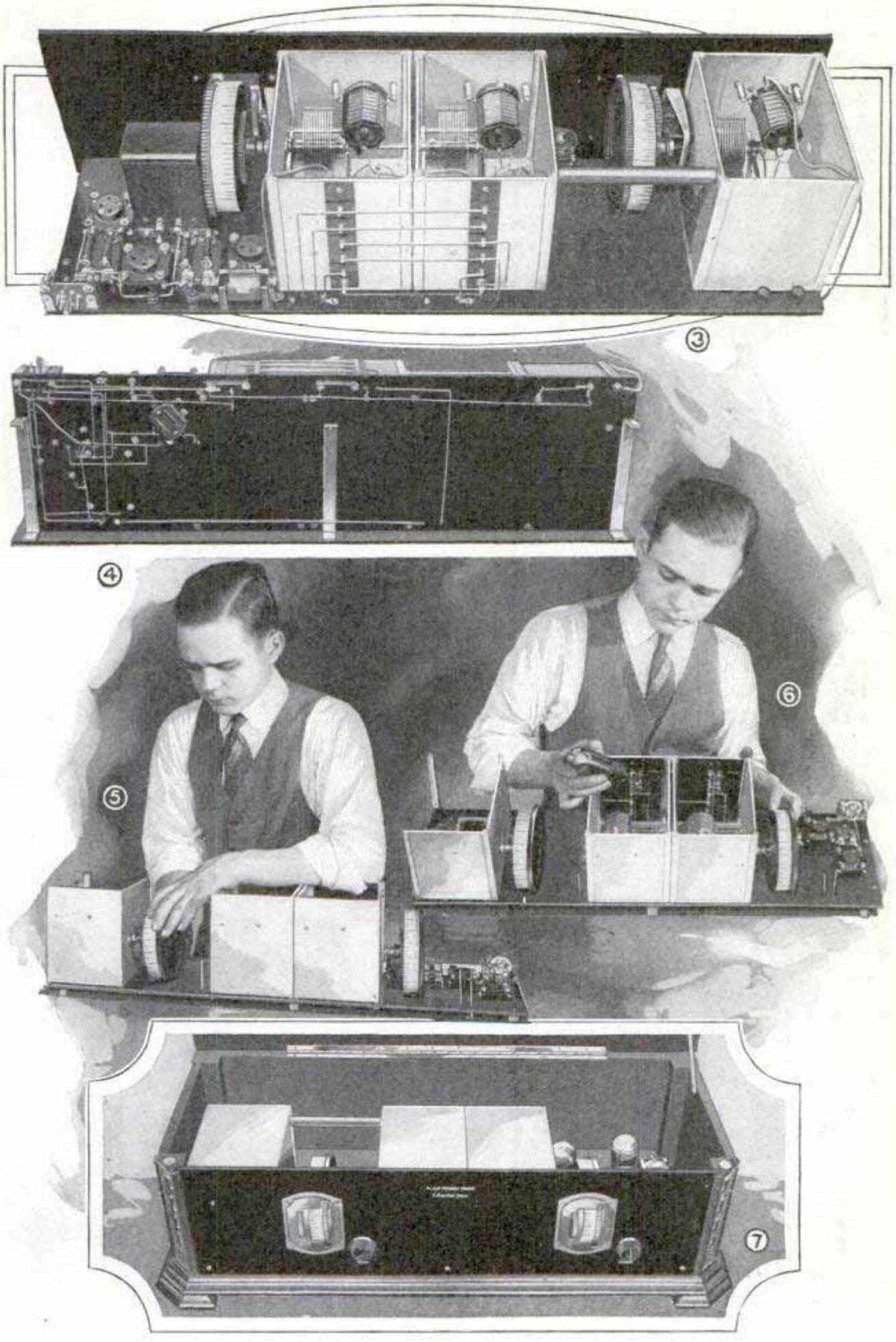
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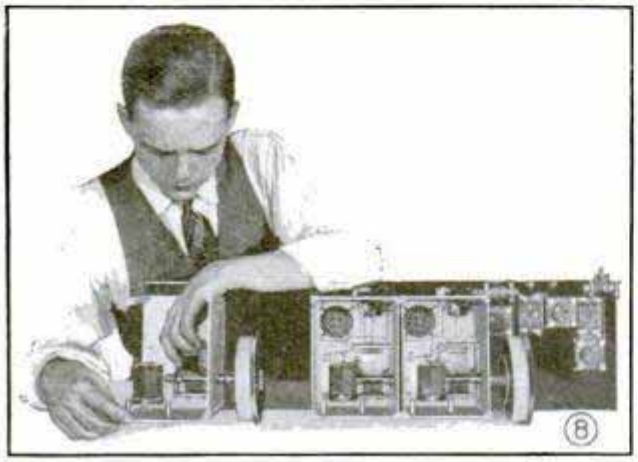
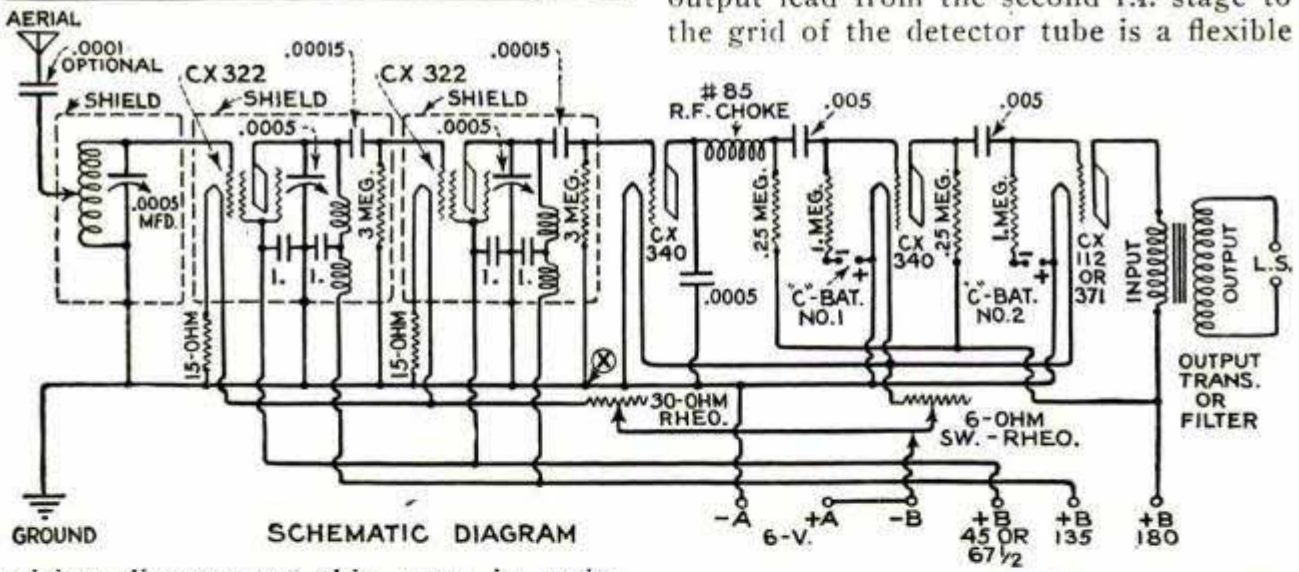
moved, to reveal the antenna coil and condenser. This coil, as indicated in the photo, is tapped and the taps brought out to terminals at the base for 5, 7 and 12 turns, enabling the builder to sharpen or broaden the tuning to suit local conditions. In crowded localities, where there are a number of broadcasting stations, it is well to use a minimum number of turns on the coil, and the .0001-mfd. fixed condenser, marked "optional" in the schematic





wiring diagram on this page, in series. For those located where sharp tuning is not imperative, the fixed condenser in series with the aerial may be omitted, using the seventh or twelfth turn of the coil.

Photo 9 shows the mounting of the drum-dial support brackets on the rear of the front panel preparatory to bolting the front panel to the subpanel assembly.

Complete all the wiring possible on the subpanel before placing the front panel in position. Subpanel brackets raise the subpanel, facilitating the wiring beneath it, and the only instruments mounted under the subpanel are the two 15-ohm resistors, and the .0005-mfd. fixed condenser

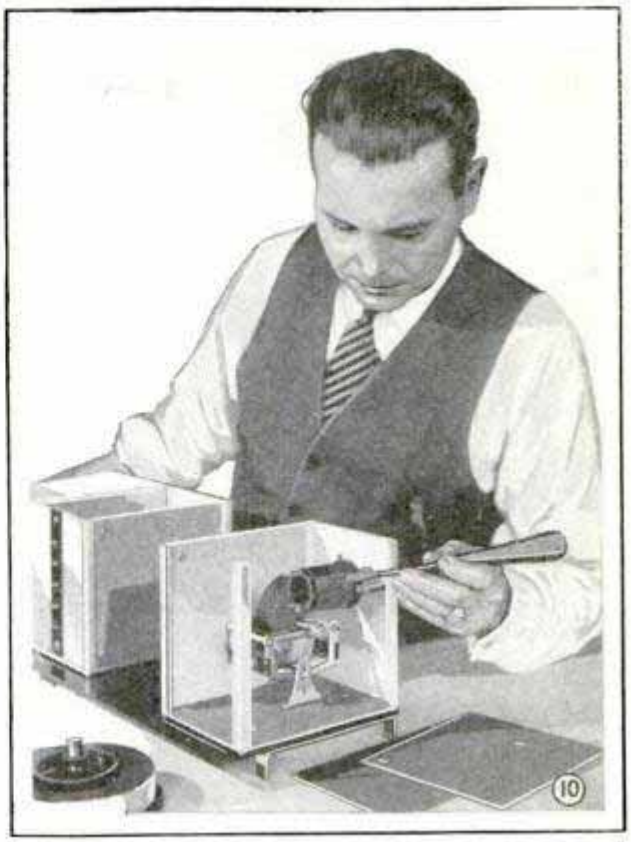
connected to the plate of the detector tube and the negative-A line. The aerial lead to the coil in the tuner stage is a flexible rubber-covered wire, soldered to the aerial post beneath the subpanel, and brought up through the side of the shield at top; this shield is connected at the base to the ground binding post. The copper or brass tube, between this shield and the first r.f. stage, shields the lead running from the stationary plates of the variable condenser to the control-grid connection at the top of the first CX-322 r.f. tube. Note the external connections at the rear of each of the r.f.-stage shields; these are marked for their respective positions, as shown below the simplified wiring diagram on page 302. A 9½-in. shaft, ¼ in. in diameter, connects the variable condensers in both of the r.f. stages. Note that each condenser is mounted on a support bracket at the rear, in each stage, and also bolted through the side of the shield, grounding all rotor plates. The output lead from the second r.f. stage to the grid of the detector tube is a flexible

rubber-covered wire and should be shielded. This may be done by using special shielded wire, or by wrapping tinfoil around the lead between the stage shield and the detector grid. This conductor shield should also be grounded on the stage shield, but it must not touch the detector-grid post. The resistor units for the two a.f. stages are two Daven, type 43, couplers; these have the proper blocking condensers included in their assembly for the type-340 amplifier tubes used. The power tube and the output filter unit are placed directly in front of the resistor units, as in photo 3, showing the completed set.

All battery leads, as well as the speaker tip-jacks, are taken care of by the cable and receptacle plug specified. The mounting for the connector device is shown at the lower left-hand corner of photo 3. Check all of the wiring with both the simplified and schematic diagrams, and be sure that all connections are well soldered.

The point marked X in the schematic diagram on page 306 is connected to the negative-A line, but may be connected to the positive-A line as desired, for either a positive or negative bias on the grid of the detector tube. The C-battery No. 1 is of the usual tapped 4½-volt type and either 3 or 4½ volts may be used; C-battery No. 2 must be of the proper voltage required for the grid of the power tube used. Note the table below the wiring diagram. Note also that the positive terminal of C-battery No. 2 is connected directly to the negative-A at the battery.

A good ground connection, and a one-



Assembling Aerial Tuner Stage; Pointing Out Tapped Turns for Optional Aerial Connections on the Coil

wire aerial, about 35 ft. long, should be used for maximum results; when the set is used in localities remote from broadcasting stations, a 100-ft. aerial will be better. Connect all batteries and try one tube successively in each socket with the rheostat-switch in the on-position; if the tube lights satisfactorily in each socket, insert all the tubes in their proper sockets, and the set is ready for use. No balancing is required; the volume is controlled by the 30-ohm rheostat, and both tuning dials will be found to tune about alike.

MATERIAL LIST

1 front panel, 3-16 by 8 by 30 in., available drilled and engraved.
1 subpanel, 3-16 by 8 by 29 in., available drilled.
2 Tyrman vernier single-control drum dials.
1 6-ohm rheostat with switch, Frost No. S-1906 or similar type.
1 30-ohm rheostat, Frost No. 1930 or similar type.
1 Camfield ant. stage complete, available knocked-down or assembled.
2 Camfield, type 222, amp. stages complete, available knocked down or assembled and wired.
3 sockets, standard X-type, Benjamin or similar type.
2 Daven resistor couplers, No. 43.
2 resistors, .1 meg., Daven or similar type.
2 resistors, .25 meg., Daven or similar type.
2 Yaxley, 15-ohm resistor units.
1 Samson, No. 85 or similar type, choke coil.
1 set, Karas subpanel brackets.
1 speaker-filter unit, General Radio 387-A or similar type.
1 cable and receptacle plug, with phone tip jacks, Yaxley No. 669 or similar type.
4 engraved binding posts.
1 .0005-mfd. condenser, any good molded type.
18 soldering lugs, long round-hole type.
13 round-head, 6-32 brass machine screws, ⅝ in. long, nickelplated.
10 round-head, 6-32 brass machine screws, 1 in. long.
8 lengths No. 14 round tinned-copper busbar wire.
2½ ft. stranded rubber-covered hookup wire.

SUGGESTED EQUIPMENT

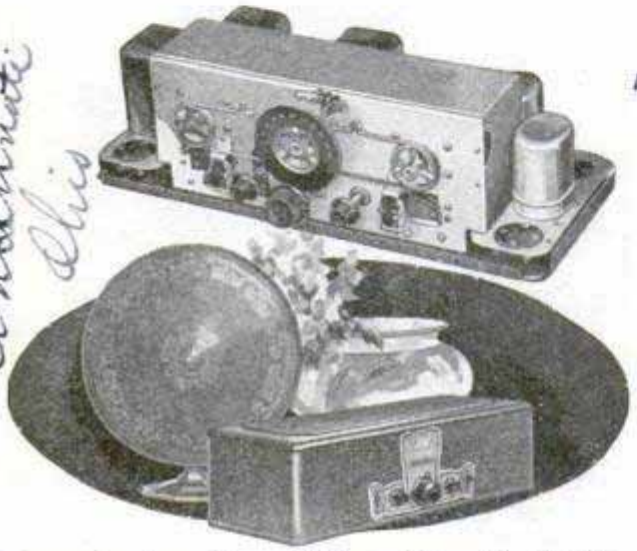
1 CX-112 or 371 tube.
2 CX-340 tubes.
2 CX-322 tubes.
4 45-volt heavy-duty B-batteries.
1 tapped-type, 4½-volt C-battery, Burgess 2370 or similar type.
1 tapped-type C-battery, voltage depending on type of power tube used.

There may be a slight variation in the aerial tuner dial, but this can be compensated for by shifting the position of the rotor plates on the shaft of the aerial tuning condenser.

A set of large blueprints of all wiring diagrams and full-size drilling templates have been prepared, and may be obtained from Popular Mechanics radio department, 200 E. Ontario st., Chicago, for 50 cents to cover cost and mailing. Specify blueprints No. 128.

Compact Set for Console Installation

This receiver combines several interesting features and was one of the attractive

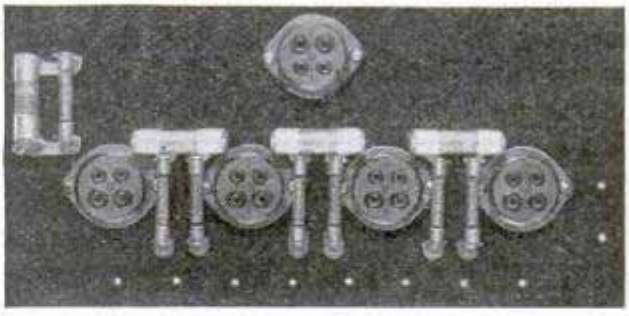


Above, Receiver without Cabinet; Below, Standard Assembly Showing the Comparatively Small Size

exhibits at the fall radio shows. It has been designed in two models, one for d.c. and the other for a.c. operation. The circuit is of the balanced type, with three stages of r.f. amplification, detector and two stages of a.f. amplification, a power tube being used in the last stage for maximum output without distortion. Both a.c. and d.c. models employ the same basic circuit, but differ, of course, in details. Tuning is accomplished by means of a single master station selector, with an illuminated dial. There are two auxiliary tuning controls, called "acuminators," for sharp tuning in or receiving distant stations, and, in addition, a volume control and switch on the control panel, cutting off the power supply when the set is not in use. Both types are built into identical metal cabinets, which have a crystalline finish. A feature of these cabinets is the ease with which they may be removed from the sets, it being necessary only to remove the "escutcheon," through which the controls project, to lift the cabinet from the chassis. This feature makes possible the adaptation of the set to a number of different types of consoles.

Complete Subpanel Unit for Five-Tube Set

A subpanel unit or "deck" with all necessary instruments for a complete five-tube receiver less the tuning elements, is now available for the set builder. All parts are mounted directly on the subpanel, the coupling condensers and resistors for the resistance amplifier being held in place by specially designed clips. The fixed condensers are of a new cartridge type, incased in glass tubes, and metal caps, similar to those on the resistors, fit into tight-locking clips. The by-pass condensers for the input of the audio-amplifier are of the same type. A double clip of new design provides a strong and neat mount for the grid condenser and gridleak. Holes are provided at the rear for ten binding posts, but the posts are not supplied because some con-



Top View of Subpanel Unit Showing Sockets, Resistors and Condensers

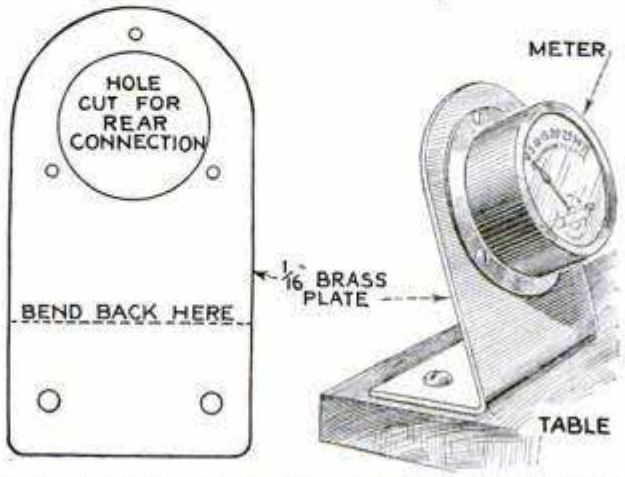
structors prefer to use a cable for battery connections. The addition of a front panel, coils and variable condensers makes a complete receiver, and construction details for a set of this type will appear in an early issue of this magazine.

¶To prevent oscillation in r.f. stages designed for high amplification, choke coils are put in the plate circuit of each stage.

THESE valuable kinks have been written especially for Popular Mechanics Magazine by prominent radio experts. They represent not merely ideas, but practical advice from the best technicians in the profession on methods that will help make your set more efficient in operation, more convenient to handle or easier to build.

Table Mounting for Panel Meters

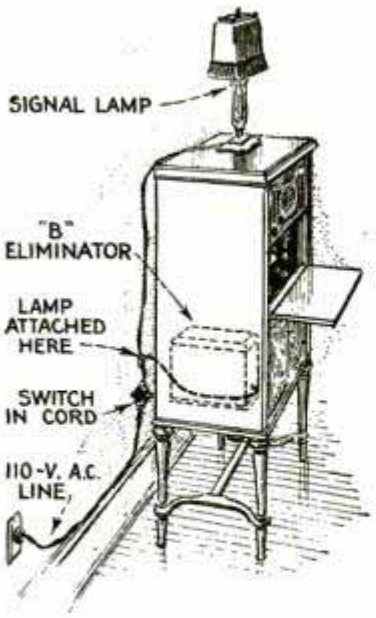
Very often panel-type meters are used in the laboratory, by experimenters, electricians and in every amateur transmitting station. Usually these are laid on the table, but owing to the rear-meter connections, will not lie flat unless holes are cut into the table. The type of table mounting shown in the sketch is very handy and neat and can be made quickly by anyone with ordinary tools. A sheet of metal, which may be iron, brass or aluminum, 1/16 in. thick and slightly wider than the meter, is cut in the form shown. About 1½ in. from the bottom of the meter and from the table, it is bent at right angles. If preferred, it can be bent over a little more, so that the face of the meter can be read from above or at an angle. A hole is drilled to allow the rear-meter connections to protrude through the rear of the mounting. Holes are also drilled for the three meter screws and two holes at the bottom. Through these the mounting is fastened to the table. The mounting can now be finished by painting it in black enamel to match the color of the meter, and the finished article will look like a factory job. If holes can be drilled in the table, the wires to the meter can be run under the table to the meter at the rear and so be out of sight.—H. R. Wallin, radio operator, S. S. "Cornelia," Brooklyn, N. Y.



Left, Template for Metal Support; Right, Meter Mounted Ready for Wiring

Signal Lamp for B-Eliminator

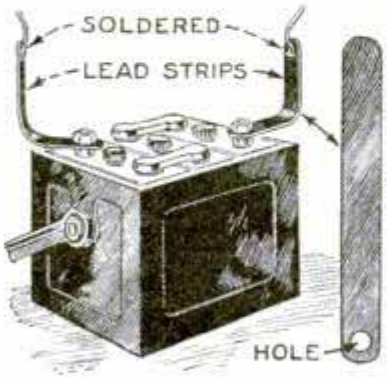
My experience, as well as that of my friends, shows that we are quite careless about leaving



the B-eliminator connected to the 110-volt line when the set is not in use. This not only consumes unnecessary current but materially shortens the life of the eliminator, especially at a no-load voltage. To overcome this carelessness, I now use a lamp as a signal when the eliminator is on. The supply line is tapped between the push-button switch in the cord and the power units in the set. The same method may be used with a red glass bull's-eye mounted on the front panel.—C. R. Yarger, chief engineer, Station KFNF, Shenandoah, Iowa.

Preventing Battery Corrosion

Corrosion at battery terminals should not be ignored and as soon as it is noticed immediate steps should be taken to prevent the leads from injury. Corrosion at these points manifests itself in poor reception, flickering filaments and uneven volume. A simple method of stopping or preventing it is shown in the sketch. A piece of sheet lead, 1/16 to 1/8 in. thick, is cut into strips, 3/4 in. wide and about 4 1/2 in. long. A hole is drilled at one end to fit the battery terminal, as shown at right, and the strips are bent and mounted on the terminals. Turn the nut down tight and cover each terminal with vaseline. The wires are then soldered to the top end of the lead strips, and these connections are also coated with vaseline. Connections made in this manner will last for the full life of the battery. Another point in preventing corrosion, or "sulphating," is to keep the battery fully charged, and watch that the water level does not fall below the tops of the plates.—Harry Saine, chief engineer, Station KQW, San Jose, Calif.



A Stable B-Eliminator Filter

With the wide-spreading use of B-eliminators, the homemade type has appeared in many varieties. Rectifying tubes are used to convert the 110-volt, 60-cycle supply to direct current. These tubes do a good job in this respect, but they do not smooth out the variations in the d.c. This action is accomplished by a filter system included between the rectifying tube and the receiving set. It is a relatively simple matter to construct a complete B-battery eliminator according to instructions supplied by many manufacturers of the parts, but many an experimenter has found that such an eliminator will not work on every type of receiver. The greatest trouble is experienced with resistance-coupled audio amplifiers. When placed in operation

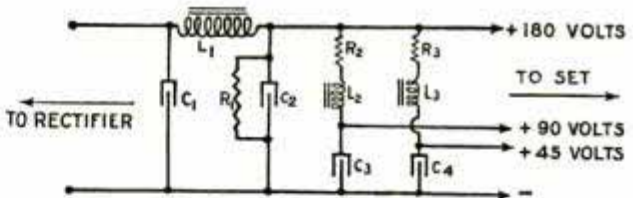


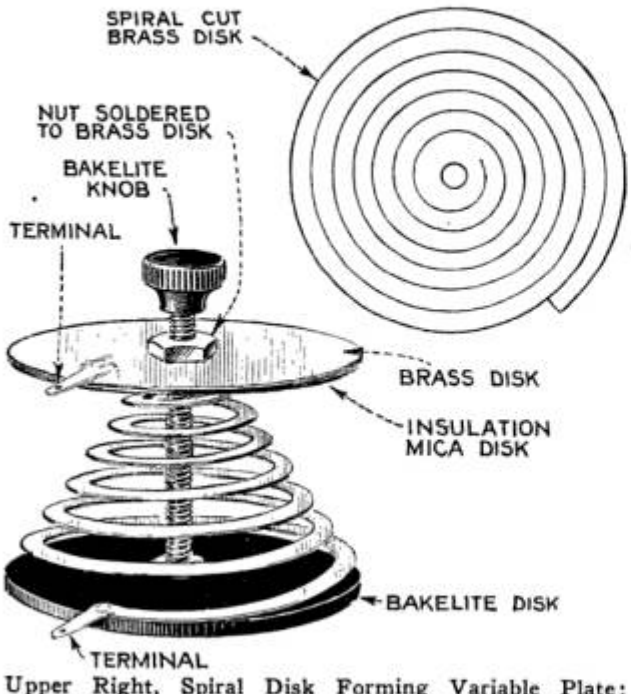
Diagram of Filter System

with a set of this type, a fluttering or popping sound is often the result, and this disturbance has been termed "motorboating." The cause is usually the common resistance shunt specified for the eliminator, from which taps are taken for the different voltages required for the receiving set. The currents drawn by the different tubes all pass through this common resistance, thereby setting up reactions of one circuit on another which result in instability. In the diagram is shown a filter which has proved absolutely stable where other types have failed. L_1 is a high-capacity choke coil of from 25 to 30 henrys; C_1 is a 4-mfd. condenser; C_2 an 8-mfd. condenser, and R_1 a protective resistance of from 50,000 to 100,000 ohms. The choke coils L_2 and L_3 are about 20 henrys, and may be the secondaries of old style a.f. transformers. R_2 and R_3 are series resistors

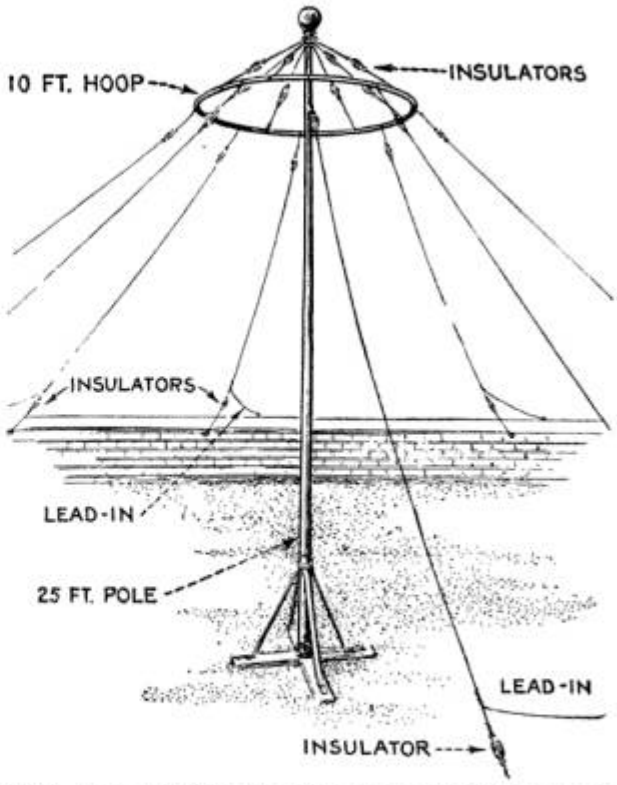
used to reduce the voltage to values suitable for the detector and r.f. amplifiers, their values varying with the number of tubes supplied, but usually being about 15,000 ohms for R_2, and 50,000 for R_3; C_3 and C_4 are 2-mfd. condensers. The various voltages available at the terminals may be regulated by varying R_1, R_2 and R_3. Variable resistances, such as clarostats or truvolts, may be used for this purpose.—W. J. Creamer, Jr., service engineer, Bangor, Me.

Simple Vernier Condenser

A simple vernier condenser may be made up from scraps, and will prove very effective when a small variable capacity is required. Two disks of thin spring brass, about 2 in. in diameter, a mica disk of the same size, a bakelite disk for the base, one long brass machine screw, a knob for the top and a few nuts and soldering lugs are the materials required. A center hole is drilled through all four disks. The diagram at upper right shows the method of cutting the spiral, whereupon a little stretching will result in a flat spring. The maximum capacity will be reached when the top plate is screwed down on the bottom plate. These condensers are often useful in series with standard variable condensers as verniers, for neutralizing r.f. stages, etc.—M. M. Paggi, chief engineer, Station KFWO, Catalina Island, Calif.



Upper Right, Spiral Disk Forming Variable Plate; Below, Assembled Unit Ready for Use



Aerial Mast Designed for Apartment Building, Showing Method of Distributing Aerials

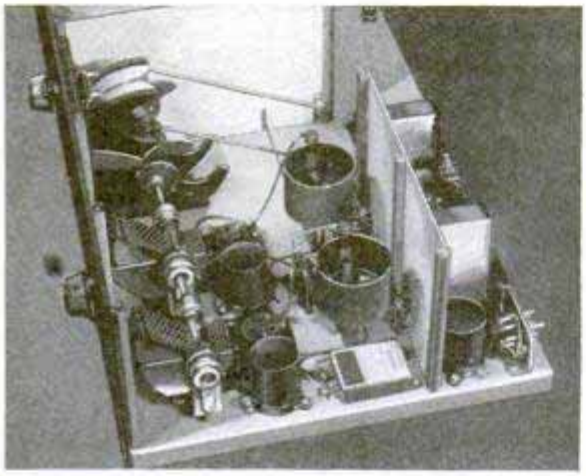
Support for Aerials on Apartment Building

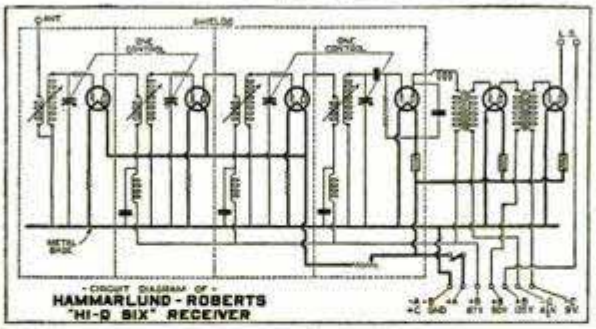
The arrangement of aerial masts on apartment buildings is often a serious problem to both owner and the tenants, because random crossing of wires prevents good reception, and the damage done to the roof by unskilled amateurs usually leads to trouble. A simple remedy is offered in the sketch. A 25-ft. pole is mounted on a base that rests flat on the roof, guy wires holding the mast upright, without the use of nails in the roof at the base. The top of the mast may be ornamented with a ball or weather vane if desired. A 10-ft. hoop is supported by insulated wires from the top, as shown. The various aerials are insulated from this hoop and taken to insulators fastened to the side wall of the building, immediately above the apartment to be supplied. The lead-in wire is then soldered to the aerial wire, and taken through stand-off insulators down to the apartment window.—J. E. Christensen, engineer, Riswell Radio Co., Chicago.

¶Popular Mechanics radio department offers its information service free to all readers of our magazine. We will be glad to help you with your radio problems and will promptly answer all inquiries directed to this department.

Automatic Variable Coupling Features New "Hi-Q Six"

Automatic variable coupling and complete isolation of each of the four tuned stages, combined with symphonic audio amplification, make this new "Hi-Q Six" of special interest. Each stage operates independently without interaction between any of the stages, resulting in higher amplification per stage, greater selectivity, stability and absence of background noises. Designed to be built by the average set builder at a low cost, this new receiver is said to provide a higher degree of performance than has hitherto been possible except in non-commercial, laboratory instruments. The automatic variable coupling, a new idea in radio, is said to secure maximum and uniform amplification over the entire tuning range; exceptional sensitivity and selectivity with full volume without oscillation are obtained, and symphonic audio amplification, which, with a power tube, is said to faithfully reproduce both speech and music with the timbre and character of the unbroadcast original. Every modern construction feature, such as steel chassis, heavy aluminum shielding, battery cable and centrally located illuminated drum-dial control, is available for the builder.



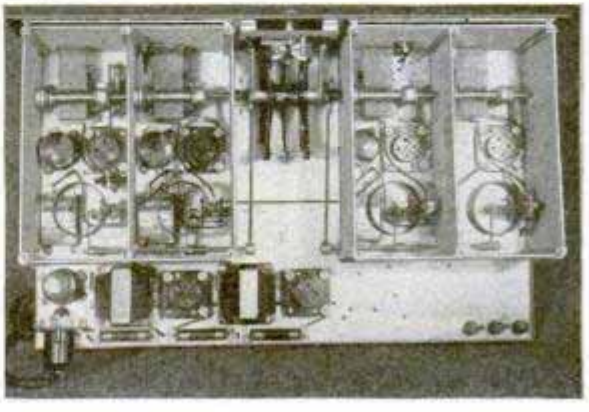


Above, R.F. Stage Shield Removed, Showing Coils and Condenser Assembly; Right, Schematic Circuit Diagram, and, at the Bottom, Top View of the Assembled Receiver

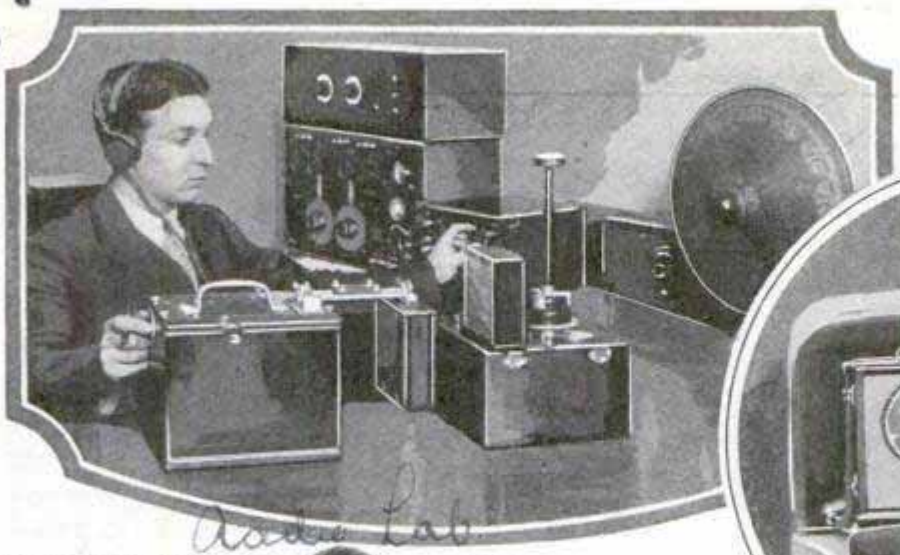
The set employs three stages of tuned r.f. amplification, a non-regenerative detector and two stages of transformer-coupled a.f. amplification, self-adjusting filament controls, and non-microphonic tube sockets. The photos show the simple construction details and require little comment; the shields are somewhat of a novelty, since most of the shield sections may be inserted after the wiring has been completed; they are slotted to take the wiring without injury to the insulation. The materials are all of standard make, obtainable from any dealer in radio supplies, complete construction details and wiring diagrams being supplied.

Eliminating B-Eliminator Hum

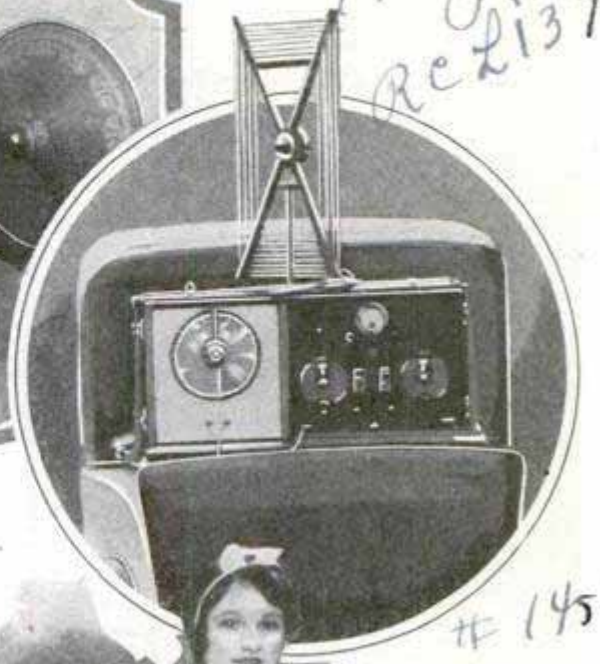
B-eliminators have reached a state of perfection where there is little or no hum when correctly installed and operated, but if a hum is present, a slight adjustment will often correct the trouble. Installed in console sets, the eliminator frequently offends in this manner, while, operated outside the console, it will be perfectly quiet. The reason is that the magnetic field around the power transformer in the eliminator will couple with the fields around the other units and give rise to a hum. Turning the eliminator at an angle in either direction will often remedy this trouble. Long leads to the eliminator should be bunched together and tied; the standard battery cables for connections between the eliminator and the set are advised.



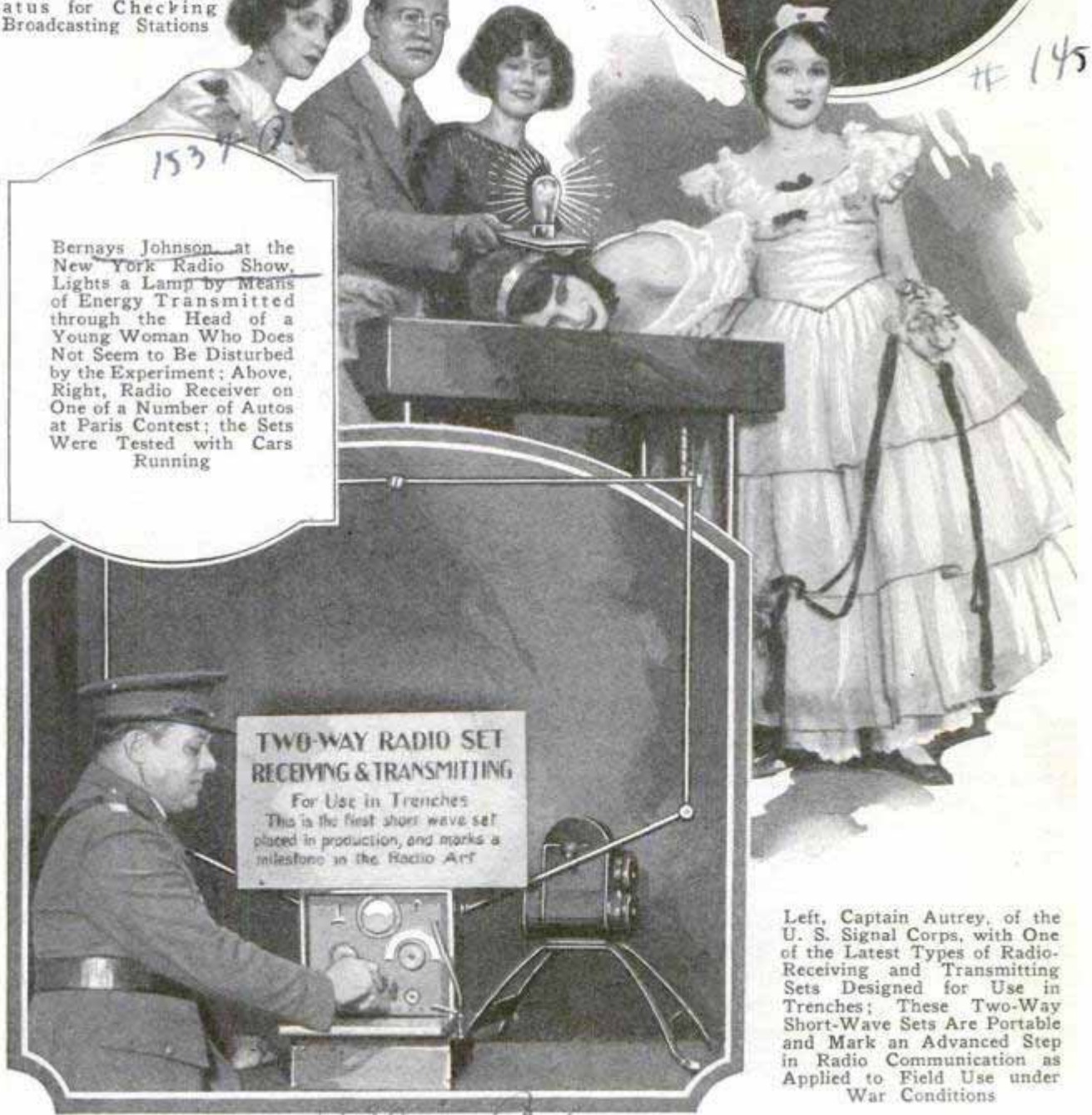
Facts and Fads for Radio Fans



Above, Bureau of Standards' Measuring Apparatus for Checking Broadcasting Stations



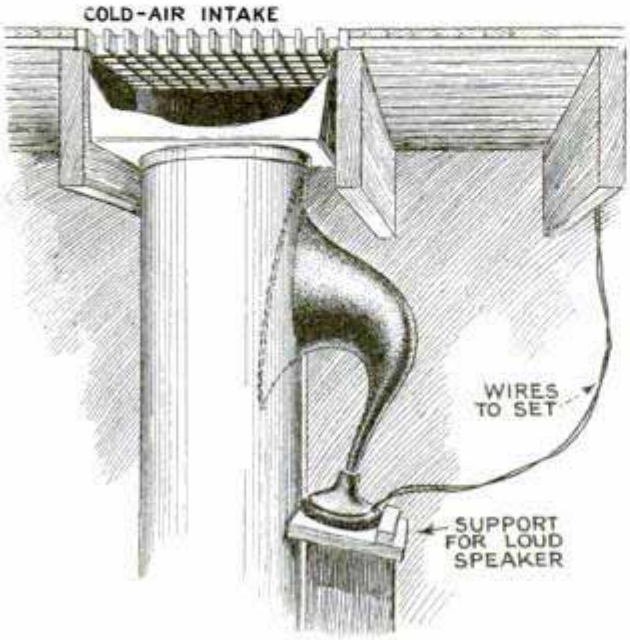
Bernays Johnson, at the New York Radio Show, Lights a Lamp by Means of Energy Transmitted through the Head of a Young Woman Who Does Not Seem to Be Disturbed by the Experiment; Above, Right, Radio Receiver on One of a Number of Autos at Paris Contest; the Sets Were Tested with Cars Running



Left, Captain Autrey, of the U. S. Signal Corps, with One of the Latest Types of Radio-Receiving and Transmitting Sets Designed for Use in Trenches; These Two-Way Short-Wave Sets Are Portable and Mark an Advanced Step in Radio Communication as Applied to Field Use under War Conditions

Hiding the Loud Speaker

The practical method of hiding the loud speaker indicated in the illustration has several advantages other than that of placing the speaker out of sight. As it is



Loud Speaker in Position Showing Method of Mounting the Base

mounted in the cold-air intake pipe of the furnace, visitors are always at a loss to know whence the music is coming. From a practical standpoint, it saved throwing away an old horn of the gooseneck type which, although still good, was better out of sight. Keeping the speaker as far as possible from the set is another advantage, and, mounted as shown, it interferes in no way with the operation of the heating plant. A hole was cut in one side of the pipe, somewhat smaller than the bell of the loud speaker. This hole was cut as near the cold-air collar between the joists as possible. A piece of cheesecloth was tied over the bell of the speaker to exclude any sweepings that might fall down the cold-air pipe. The grill was removed from the floor, and the horn, with the unit detached, was let down inside of the pipe, the small end running through the hole cut in the pipe. The grill was then replaced and the unit put back on the horn. The stand, built directly under the speaker as a support, is set at an angle, as shown in the illustration, so as to direct the volume upward. If the horn fails to fill the hole in the pipe entirely, the space may be closed with strips of gummed paper. A cone may be used in practically the same manner, and will work equally well.—Arthur L. Kaser, Mishawaka, Ind.

Using A. F. Transformers for Impedance-Coupled Receivers

Impedance-coupled sets give better tone than many transformer-coupled sets, but many radio owners do not feel justified in throwing away their a. f. transformers to make the change. However, the transformers can be used as impedance coils if connected as shown in the illustration. Fig. 1 shows how the secondary is wound over the primary in the standard a.f. transformer. Using a length of busbar wire, the two coils are connected in series, making a choke of high value. How the transformer terminals are marked is also shown, as well as the variation from these markings necessary for use in the impedance-coupled circuit. If the transformer is a good one, more volume and perfect tone can be obtained by changing it into an autoformer, as in Fig. 2. In this case the secondary, having the largest number of turns, forms the plate impedance, and the primary, being connected through the coupling condenser to the grid of the next tube, adds its quota in the form of a voltage step-up. The cause of audio distortion is generally insufficient impedance in the primary at low frequencies. By the changes suggested, the plate or primary impedance is increased several times, which accounts for the success of resistance impedance-coupled amplification. The actual coupling is done by the condenser, which should be .5 mfd., or larger, in order to pass the lower frequencies without loss.

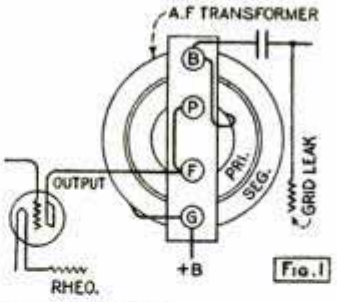


Fig. 1

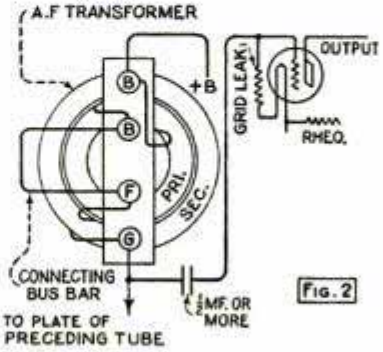


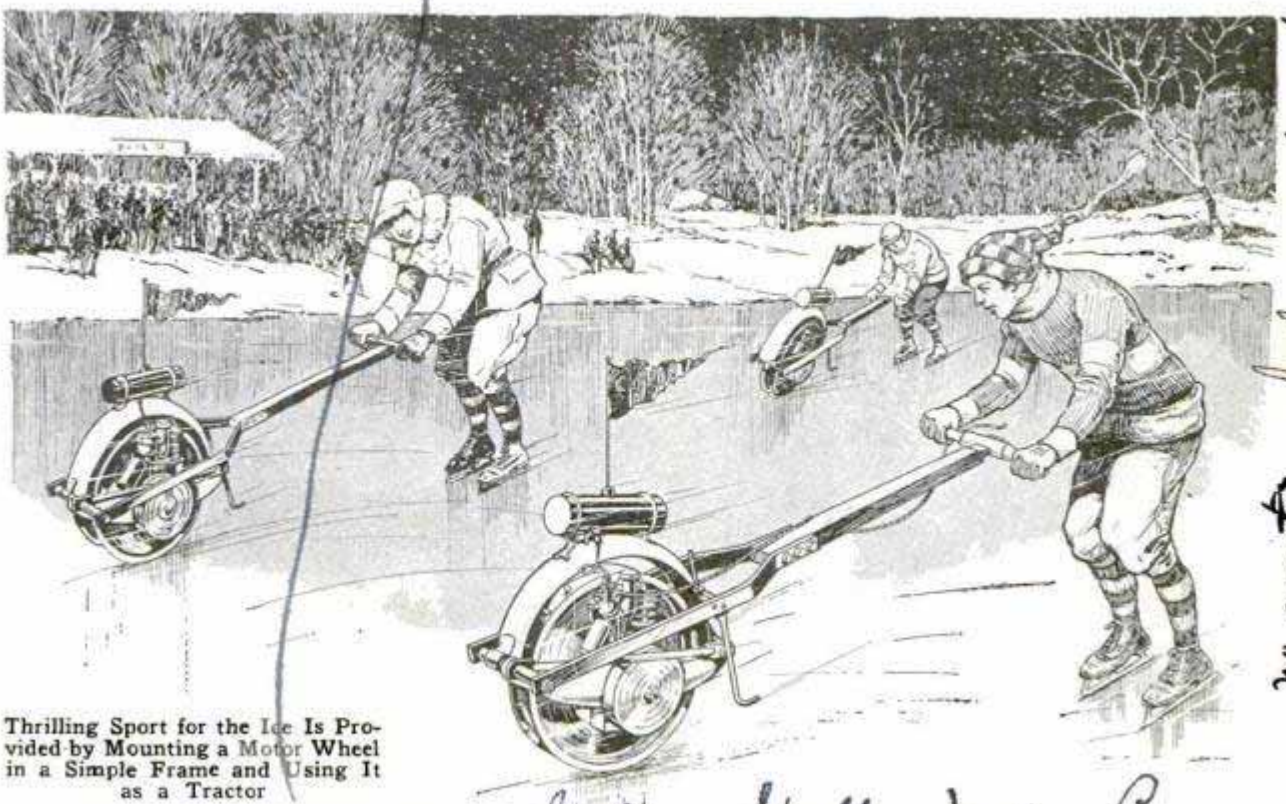
Fig. 2

Fun on the Ice with a Motor Wheel

By LAWRENCE B. ROBBINS, Harwich, Mass

EACH winter brings out some new sport. Now comes an ice tractor, a means of pulling oneself along a smooth stretch of ice with a motor wheel. Arranged as indicated in the various sketches, such a tractor is capable of pulling one person over the ice at a speed of 30 to 35 miles an hour. With several persons in a line, holding on to each others' belts, it will pull them along at reasonably good speed and give all the thrills of "snapping the whip," single-file skating and like stunts. No changes are necessary in "installing" the motor wheel for this tractor. Just remove it from the bicycle, substitute sharpened spikes for the tire, pivot the wheel in the frame, and off you can go.

Make the riding frame first. It consists of two pieces of stiff flat steel, 1½ in. wide by ⅜ in. thick, their length depending on the distance from the pivot hole for the wheel to a point about 3 in. behind the rear end of the mudguard. At that point bend the pieces in and then out again, parallel to the longer portions. When brought together, they form the sides of a fork. Drill three holes in the short ends to coincide with each other, and then bolt to the ends of a lawnmower handle that will serve as steering bar. The distance between the long portions of the irons should be sufficient to clear the sides of the motor wheel easily when it is placed between them.



Thrilling Sport for the Ice Is Provided by Mounting a Motor Wheel in a Simple Frame and Using It as a Tractor

motor wheel. Steffey Mfg Co, Dept. P, 3924 Fairmount Ave

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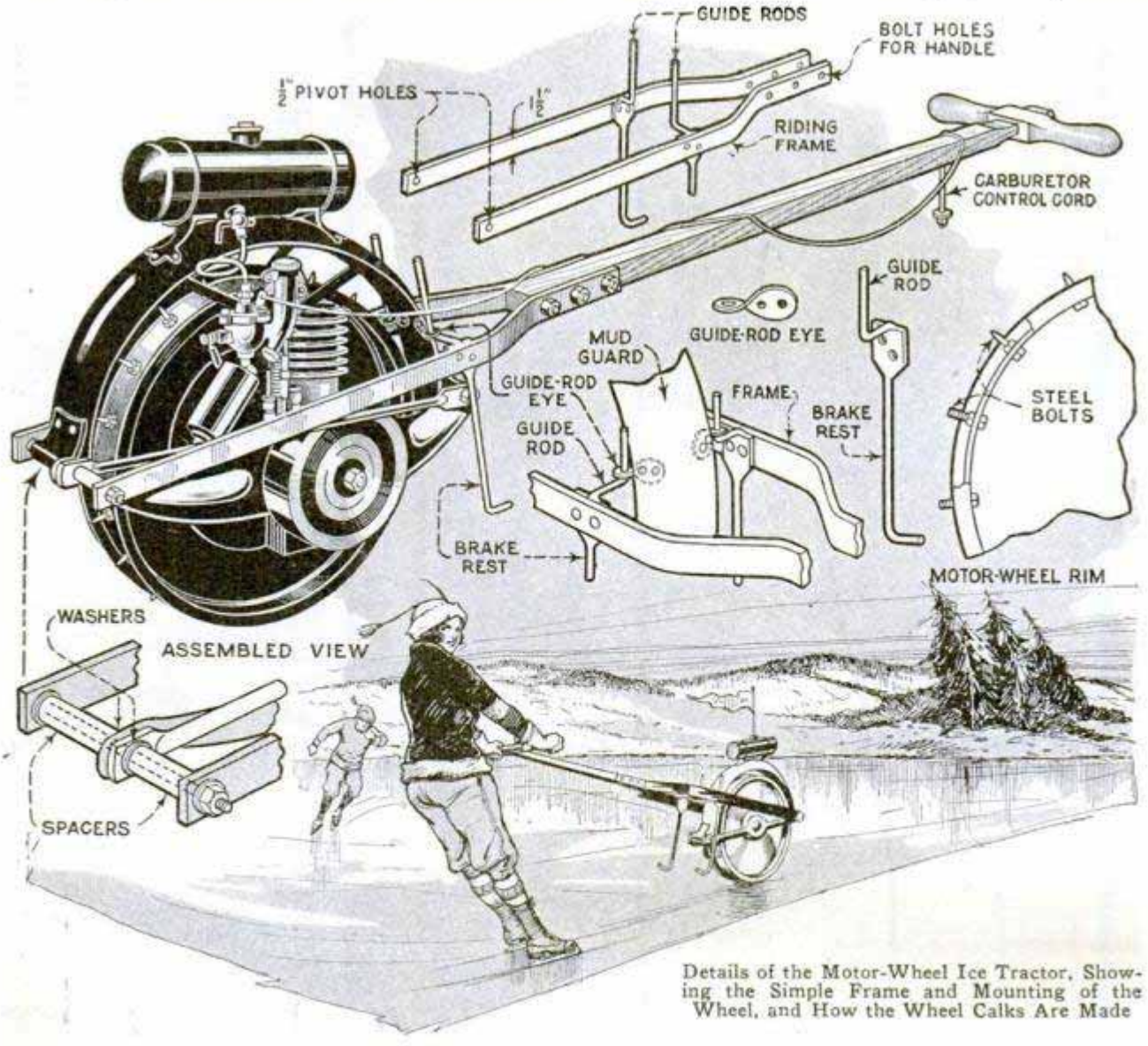
Pivot the wheel to the ends of the bars by drilling a ½-in. hole in each end and then running a ½-in. round-iron bar through these holes and the pivot hole in the front end of wheel frame. Two pieces of pipe should then be cut to fit loosely over the rod and act as spacers keeping the wheel properly centered between the sides of the frame. Their length and fit must be determined by experiment. Thread the ends of the rod and use washers at the ends of the pipes and under the nuts that secure the rod in place. When properly assembled, the outfit will appear as shown in the detail sketch.

Now make two guide eyes and rivet one to each side of the mudguard at the rear of the wheel. A ⅝-in. eye will do, and can be fashioned from flat steel, as suggested. Twist the metal, if necessary, so the flat of the eye is horizontal.

Two guide rods should then be fashioned from round iron, with a flat portion near the middle to rivet to the inside of the riding frame directly opposite the eyes. A close study of the drawing will show that these rods are bent in at right angles and then vertical and with a slight curve forward, so the eyes will slide over them if the handle is dropped down. This adjustment will necessarily have to be made to suit the occasion and by trial. The lower ends should be exactly the same length and the ends turned back at right angles, as shown. These are to act as rests for the wheel when not in use and as brakes when stopping. They should be 3 or 4 in. clear of the ice when the handle is held up by the user.

Remove the tire from the rim and put it away until summer. Then drill 16 to 18 small holes equidistantly around the center of the rim and fasten in them as many steel bolts with their ends projecting about



Details of the Motor-Wheel Ice Tractor, Showing the Simple Frame and Mounting of the Wheel, and How the Wheel Calks Are Made

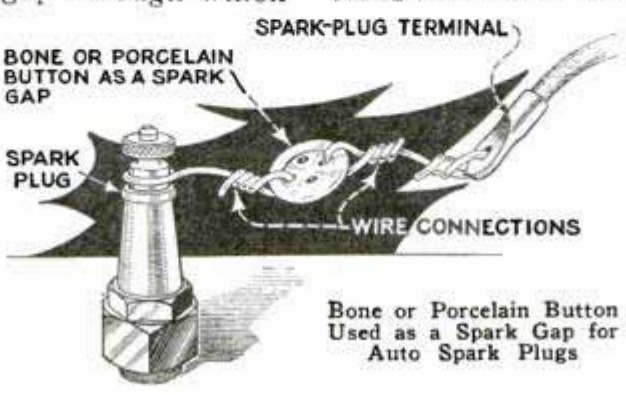
1 in. through the rim. Two nuts will hold each bolt securely. File each bolt to a short, sharp point, and you will have sufficient spikes to give good traction.

Lead the flexible carburetor control to the handle and lash it in place where it will be always under the operator's hand. An empty brass rifle shell can then be soldered to the gas-tank cap (not to the tank), if desired, to act as a socket for a small flag. Remove the cap from the tank, while soldering. Headlights can be added to the front of the frame and operated from three dry cells suitably placed, and a horn may also be attached.

The motor-wheel tractor normally should rest on the spiked wheel and the two legs provided for the purpose. When ready to use, grasp the handle in both hands and open the carburetor throttle. Then push the machine ahead as rapidly as possible by digging the spike points into the ice and running ahead. When the motor starts, the user can settle back on his skates and regulate the speed by the control. Turns can be made by slightly tipping the wheel in the direction one wishes to go but not far enough to prevent the spikes in the wheel from gripping the ice. When a stop is to be made, simply shut off the gas and lower the handle until the rests or brakes drag. This, with the compression of the dead motor, will bring the outfit to a stop very quickly.

Spark Gaps from Buttons

When making engine tests it is desirable to have some visible check on the operation of the ignition system. A simple means of forming spark gaps at the plug is ordinary bone or porcelain buttons, with the spark-plug wires attached to them. The wires are slipped through the eyes of the button, forming a gap through which the circuit will pass. When testing engines, it will be obvious that the absence of a spark at the gap accounts for missing, while, with the spark perfect and the missing still evident, the carburetion is at fault.



Bone or Porcelain Button Used as a Spark Gap for Auto Spark Plugs

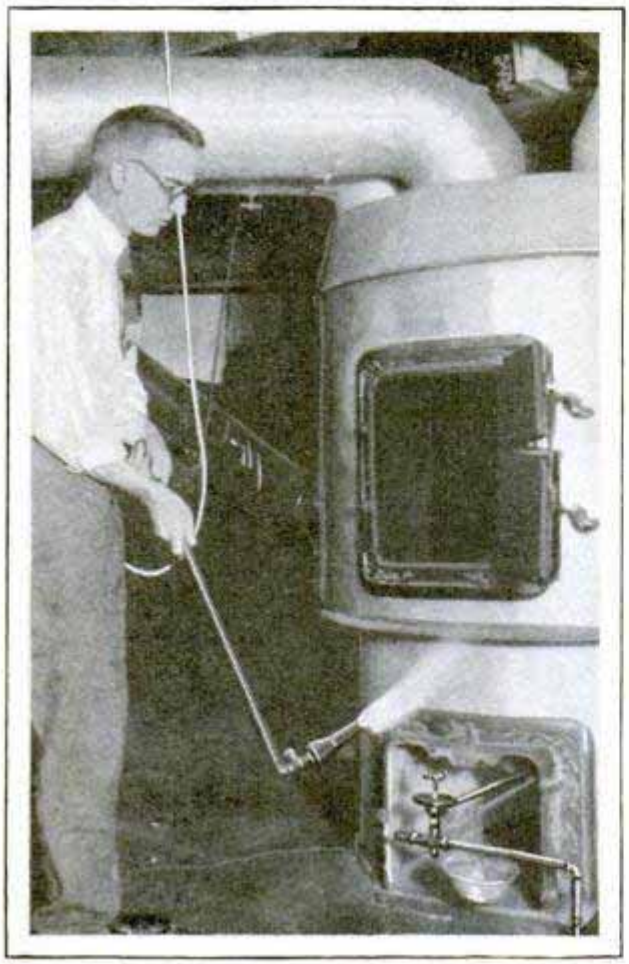
Spring Hooks for Ironing Board

Holding the cloth tight on an ironing board can be done by means of the spring

Simple Spring Hooks Which Keep Cloth on Ironing Board Securely

hooks shown in the accompanying illustration. Each of these consists of a coil spring, equipped at both ends with a hook made of stiff wire. Points are filed on the ends of these hooks, which should be done before they are attached to the spring, and bent at the ends as indicated. The straight lengths of wire, with sharpened ends, are slipped through the ends of the spring, and bent around, forming a loop which holds them to the spring securely. A pair of pliers is used to bend the points into hooks and the device is then ready, the manner of its application in use being obvious from the illustration.—H. H. Siegele, Emporia, Kans.

¶Vaseline or cold cream, rubbed well into the hands before doing grimy work stops the dirt before it reaches the skin, so that you can wash them clean easily.



Quick and Smokeless Method of Lighting an Oil-Burning Furnace with a Bunsen Burner

Lighting Gravity-Type Oil Burner Quickly and without Smoke

An oil burner of the gravity type is usually lighted in the following way: Open the valve and allow the oil partly to fill the burner bowl, then shut off the valve and throw into the oil pool a piece of crumpled-up newspaper which is lighted and serves as a wick. While the oil is being burned, the furnace door must be left partly open to provide sufficient air. By the time that the oil has been consumed, the air-intake chamber is sufficiently heated to start the burner generating gas and the door may be closed. But the difficulty is that it takes several minutes to consume the oil in the bowl, during which time the attendant must stand on watch to guard against excess smoke getting out in the room. A quicker and cleaner method is by the use of a Bunsen burner. A 4-ft. length of ordinary ⅜-in. gas pipe is connected at one end to a flexible hose and at the other to an elbow carrying a Bunsen burner, as shown in the photo. There are two ways of using this torch. The quickest one is to leave the oil valve closed and heat the oil-intake pipe between the needle valve and the burner by passing the Bunsen burner under it. In about a minute, this will heat the oil to such a temperature that it is converted into gas as soon as the valve is opened, and the burner can then be ignited by the Bunsen torch, holding the latter above the burner. The other way, which requires a little more time but is effective, is as follows: Lay the torch on the top of the burner so that the flame plays on the air-intake chamber. You may go away and leave it going as long as you like, without any danger of smoke. When you come back, simply turn on the oil valve, whereupon the oil will be ignited and will start generating at once. Then the torch is removed, the doors can be closed, and the job is done.

Substitute for Crutch

When a crutch is not available, an ordinary kitchen chair can be used, as shown in the accompanying illustration. Place the knee of the afflicted leg upon the seat, on which a cushion is provided. Step forward with the other leg and then lift the chair forward with the hands, keeping the knee in contact with the seat of the chair. While I was laid up with a broken foot, I used this method of getting about, finding it more comfortable than a crutch, as the foot was supported in a horizontal position, which eliminates the throbbing pains experienced when the leg is swinging in a vertical position.—Lindley Pyle, St. Louis, Missouri.

BUILD THIS MODEL of FLYING CLOUD

BY JAMES TATE

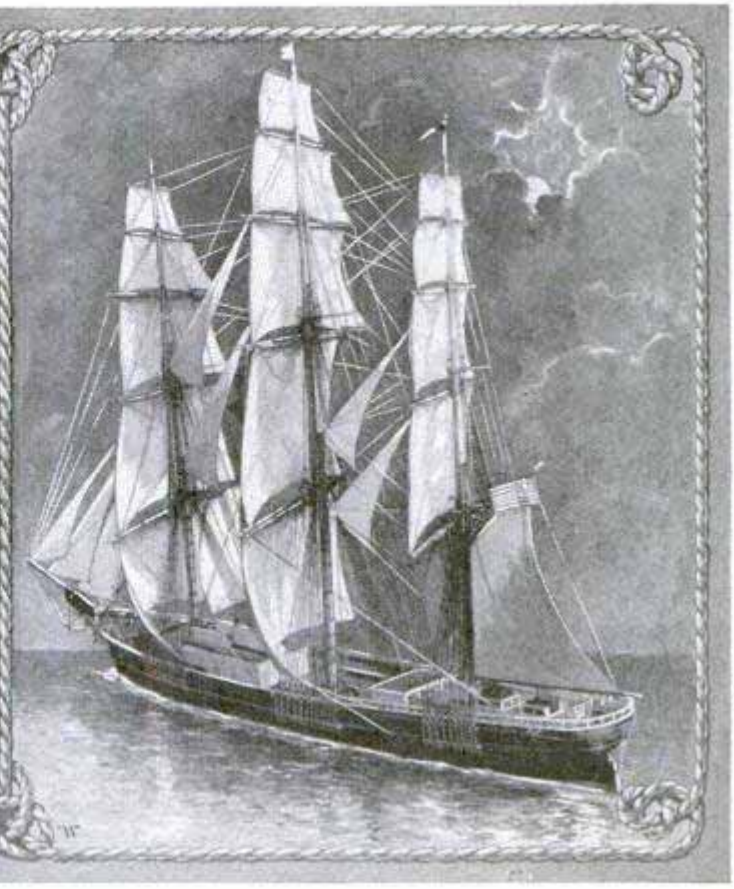


Photo © Edw. Levick

THE next thing that should be done now is to paint the hull. The upper part, down to the water line, is black, and below the water line the object is to simulate the appearance of old, water-stained copper. First turn the model upside down on blocks, Fig. 48, on a level surface, and make a simple scribing block from a scriber or sharpened piece of wire, a couple of staples and a block of wood, as shown. Bend the wire so that it touches the hull at a point 7/8 in. down from the deck line, at station No. 11; see that the hull is level in a fore-and-aft direction, then run the scribing block round the hull, pressing the water line into the soft pine with the scriber. Now paint down from the rail to the water line with several coats of black japan color, allowing each coat to dry thoroughly. The color below the line should be a sort of a yellowish salmon pink, and may be obtained by mixing some red, cream and light brown. A little taste is necessary here. Get an old piece of weathered copper, and try to imitate its color. Don't, on any account, use a metallic copper paint. Space will not permit a complete and thorough explanation of the method of making each individual piece of the deck furniture, but the reader should have no trouble in doing this work from the drawings and text herein.

The method of making the rudder is illustrated in Fig. 47. The rudder itself is of the same thickness as the sternpost, and the forward edge, next to the sternpost, is beveled 30° on each side. Make hooks and eyes (pintles and gudgeons)

SHIP-MODEL PRIZES

FEW hobbies enable the amateur to produce such beautiful work with so few tools and such inexpensive material as ship-model building. To encourage such a worth-while and pleasant pastime, Popular Mechanics Magazine offers the following awards for the best models of the "Flying Cloud" made from this series of articles, the first of which appeared in the Dec., 1927, issue.

First, $100 cash and gold medal.
Second, $50 cash and silver medal.
Third, $25 cash and bronze medal.
Five awards, $10 cash and bronze medal.
Five awards, $5 cash and bronze medal.
Bronze medals also will be awarded for excellence in workmanship.

The contest is open to everyone, regardless of age or sex. The conditions are very simple, and full details will be supplied to every reader addressing the Editor, Amateur Mechanics department, Popular Mechanics Magazine, 200 E. Ontario st., Chicago.

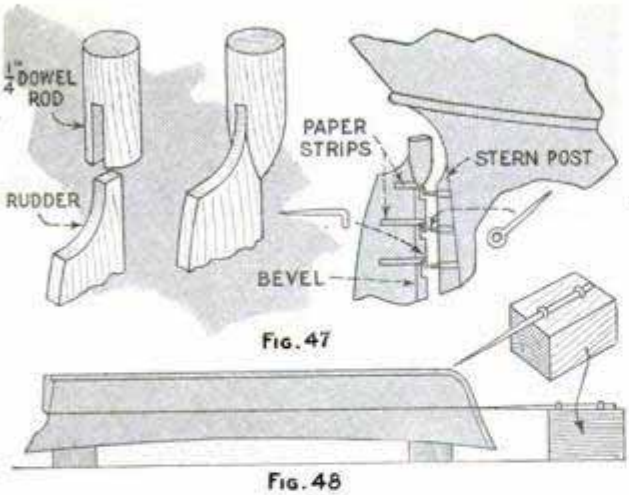


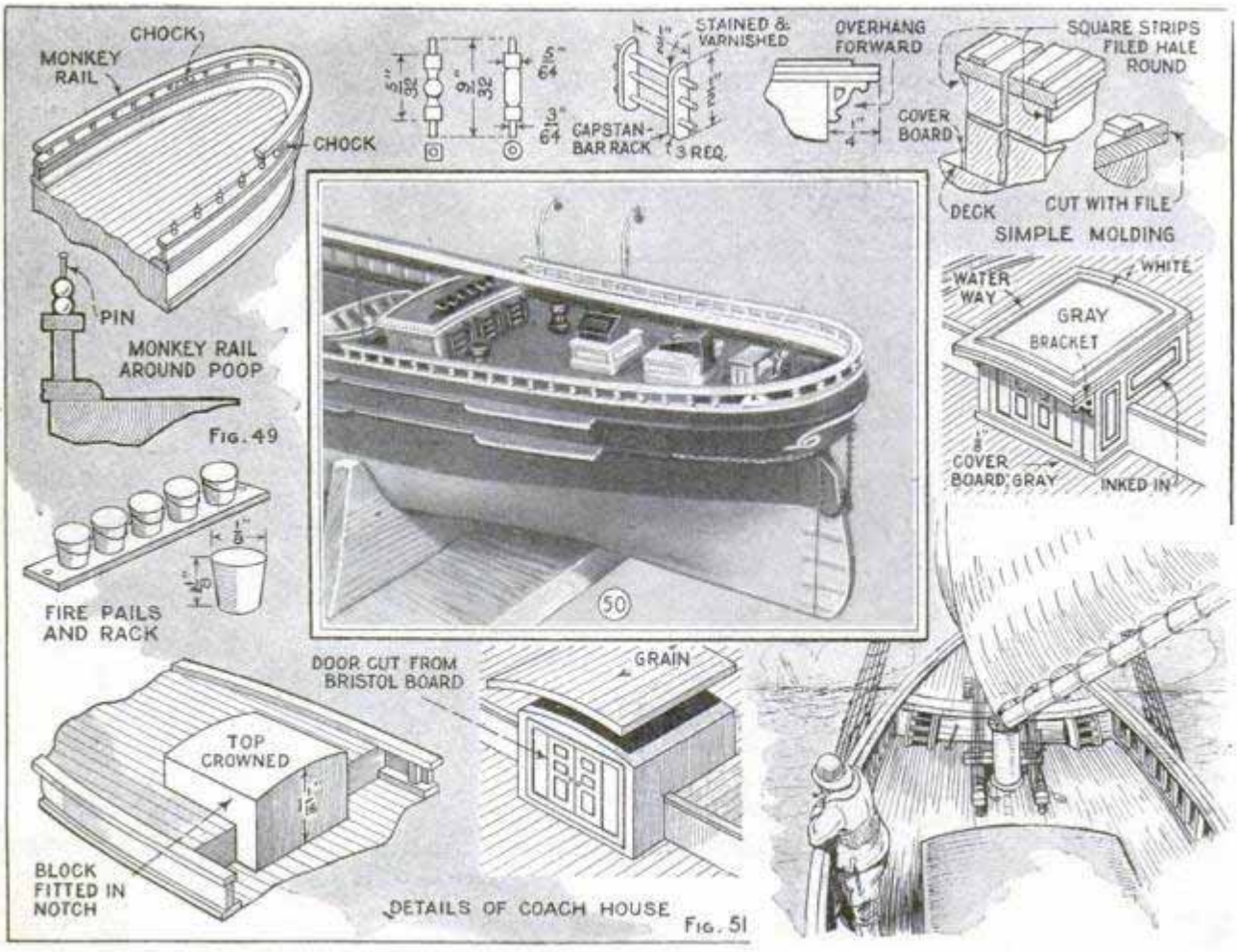
FIG. 47

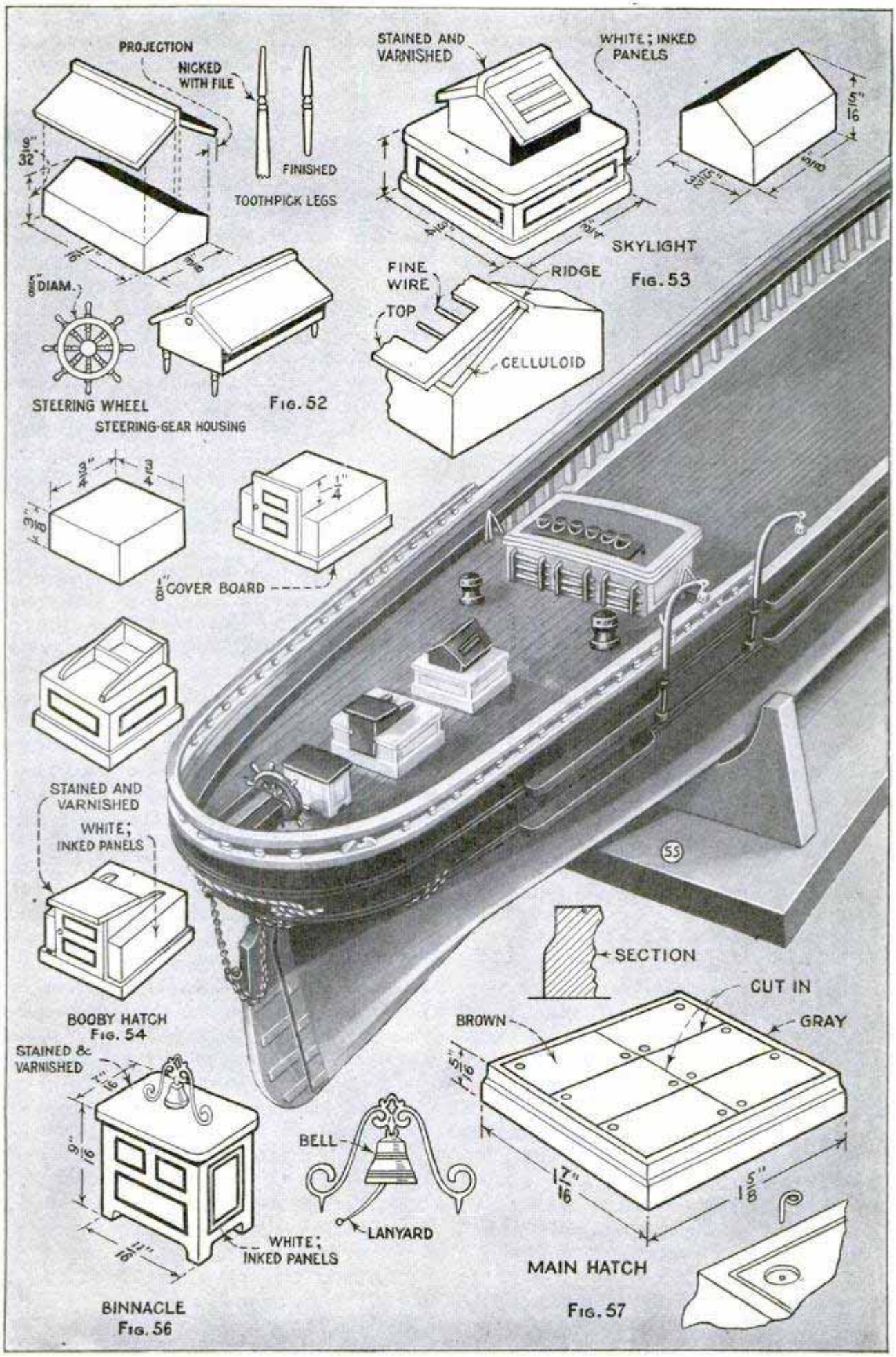
FIG. 48

from the smallest pins, and fit as shown, ½ in. apart, filing notches in the beveled edge of the rudder at each hook, so that the vertical part of the latter will be in line with the rudder edge. The rudder stock is made of a piece of ¼-in. dowel, slotted and glued over the rudder and carved to shape. The stock is glued into a shallow hole drilled up into the stern overhang. Cut a little rabbet into the bottom of both rudder and keel and glue in a slip of wood to hold the bottom of the rudder, then glue on 1/16-in. strips of paper to represent the straps of the pintles and gudgeons, and paint the rudder like the hull of the model.

The next job, Fig. 49, is the monkey rail around the poop. This is as wide and as thick as the top rail, and is best made in a similar manner, from a square, bent piece of wood. Rattan can be used if it can be obtained easily. The stanchions can either be turned from round or square brass wire to the dimensions given, or else built up from beads and pins, as shown. If the latter system is used, get some 1/16-in. pearl beads from the 10-cent store; these are rounder and more nearly uniform in size than glass beads. Don't use larger beads than this, or you will spoil the appearance of the rail. The entire rail is painted white. Leave space, between the stanchions on the quarters, for the little chocks shown.

Now fit a block, 1 1/16 in. high, into the notch in the quarterdeck, for the "coach house," Fig. 51. Crown the top like the deck. Fit a 3/32-in. roof board, allowing it to overhang ¼ in. forward and a full 1/16

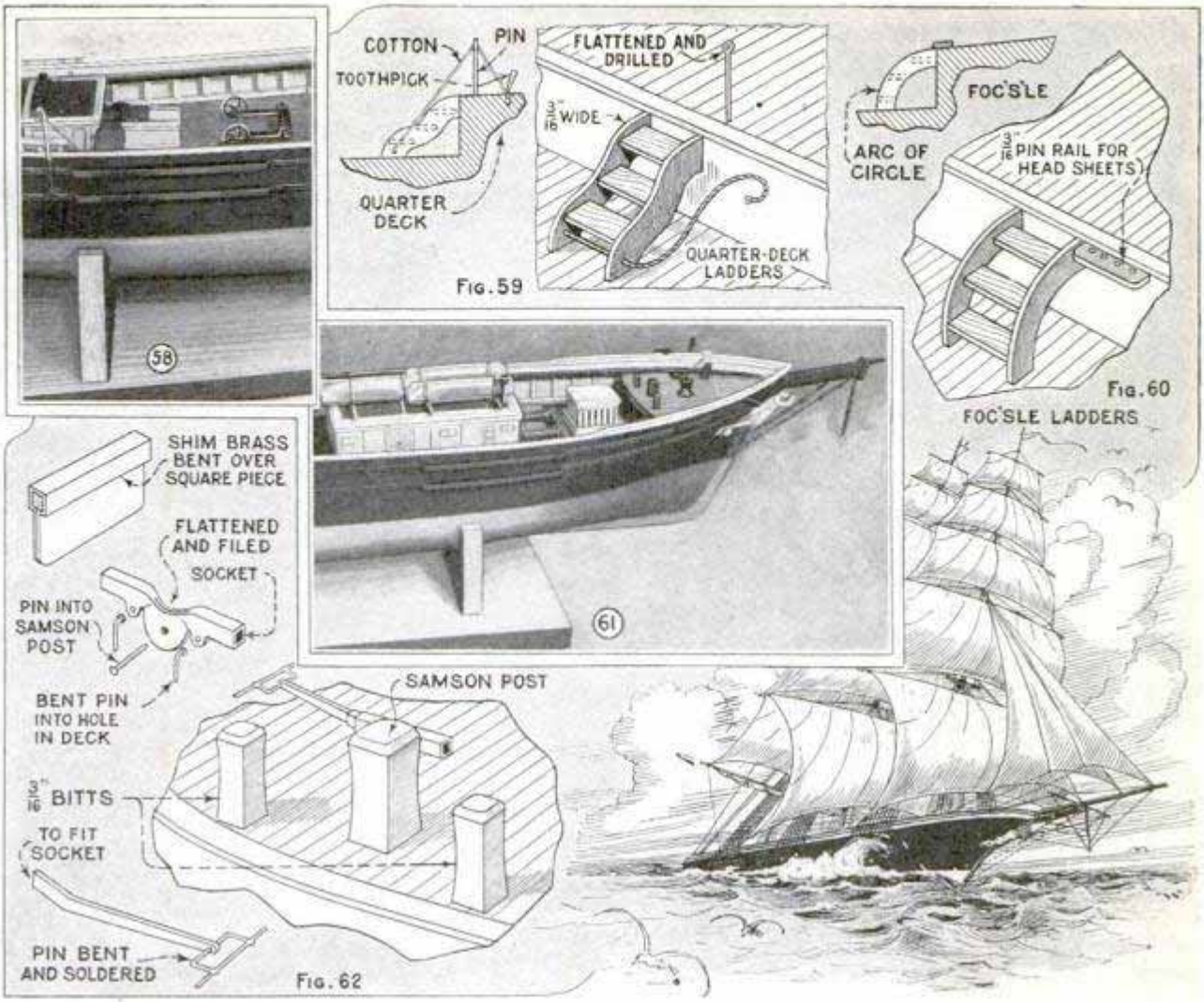



PROJECTION
NICKED WITH FILE
FINISHED
TOOTHPICK LEGS
STEERING WHEEL
STEERING-GEAR HOUSING
Fig. 52
STAINED AND VARNISHED
WHITE; INKED PANELS
SKYLIGHT
RIDGE
Fig. 53
FINE WIRE
TOP
CELLULOID
COVER BOARD
STAINED AND VARNISHED
WHITE; INKED PANELS
BOOBY HATCH
Fig. 54
STAINED & VARNISHED
BELL
LANYARD
WHITE; INKED PANELS
BINNACLE
Fig. 56
SECTION
CUT IN
BROWN
GRAY
MAIN HATCH
Fig. 57

in. on the other sides. Mold the edges of the roof with a small file, in the same manner as the hull molding, glue 1/16-in. square strips in the corners where the roof meets the block, and file these half-round. This makes a neat, attractive molding around the top of the house, and adds immensely to its appearance. Fit the brackets forward. One-eighth inch inside the edges of the roof, glue down 1/32 by 1/8-in. strips for the waterways, mitering the corners. Fit "cover boards" of the same material where the house meets the main deck. Cut the sliding doors and their frames from bristol board and glue them on. Paint the whole house white, except the cover boards and the roof inside the waterways, which are the same gray as the main rail. Use japan color for the first white coats, and finish with eggshell-gloss enamel. Using a fine lettering pen and waterproof India ink, draw in the panels on the side of the house and the doors. The heads of little pins, cut off and pressed in, form the doorknobs. Make and fit three capstan-bar racks to the after side of the house (see Fig. 50). Stain light oak and varnish. Make a fire-pail rack from a thin slip of wood and the pails from dowel stock, paint black, and glue in place on the after side of the house top. The bails of the pails are made of white thread, glued on.

The same methods are used in building up all the other deck erections. When making the steering-gear housing, for example, the block is first cut to shape and size, then the ridgepole and the top boards are glued on, the latter projecting about 1/32 in. beyond the block edges. The legs are made from toothpicks, with the beading cut on them with a small file. They should be of such a length that the steering wheel will just clear the deck. The wheel is better purchased than made, although one can be made from the drawing, Fig 52, if a small lathe is available. The housing is stained light oak and varnished. The skylight, Figs. 53 and 55, is built up in two separate blocks, the lower one white, with inked panels, and the skylight proper light oak, varnished. When the block has been made for the skylight, paint the slanting upper surfaces black, glue on slips of celluloid to represent the glass, then cut the openings in the tops and glue in two short lengths of fine wire across the underside of each opening, as indicated, gluing them down over the celluloid. The method of making the booby hatch is quite clear from the drawings. The block is white, with inked panels, and the door, sliding top and slides stained and varnished. Make two of these hatches, one on the quarterdeck; the other one, shown in Fig. 58, stands just forward of the coach house, on the main deck, the door facing aft. The binnacle, Fig. 56, is simple, and the bell and its standard can easily be soldered up on the soldering block described hereafter. The main hatch also needs little description, except that the looped and bent pins, shown in the lower view, Fig. 57, represent the eyebolts used for hoisting the hatch sections, and they are sunk into shallow, flat-bottomed holes in the corners. Paint the hatch coaming (sides) gray, and the tops of the sections brown.

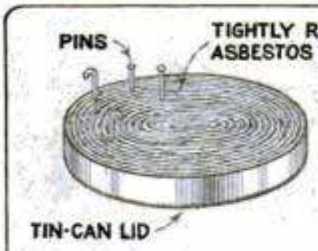
Little need be said about the quarterdeck and foc's'le ladders, except to use the thinnest wood possible, and to make them only 1/2 in. wide. The stanchions for the quarterdeck-ladder handrails are made of pins with the ends flattened and drilled; the handrail is a length of white thread, about No. 30 cotton, passed through holes drilled in the foot of the ladders, then through the holes in the stanchions, and the ends stuck in small holes in the deck, where they are fastened by driving in the glued end of a toothpick. This is cut off carefully when the glue has set. Foc's'le ladders have no handrails. At the after edge of the foc's'le deck are two 3/16 by 1/2-in. bitts, and a 1/4 by 9/16-in. samson post. These are shown in Fig. 62, and have a round peg end like the timber heads, glued into holes in the deck. The forward side of the samson post carries the pump brake for the windlass under the foc's'le. The pivot part of this is bent, soldered and filed from a piece of shim brass, and the pump-brake handles are made from 1/16-in. brass, with soldered-pin handles. Paint all black. The windlass underneath was turned by pumping up and down on these handles, rods running through the deck from the pivot piece operating on the windlass ratchets. The rods, on the model, are represented by pins, bent at the top into holes in the pivot, and passing down through small holes in

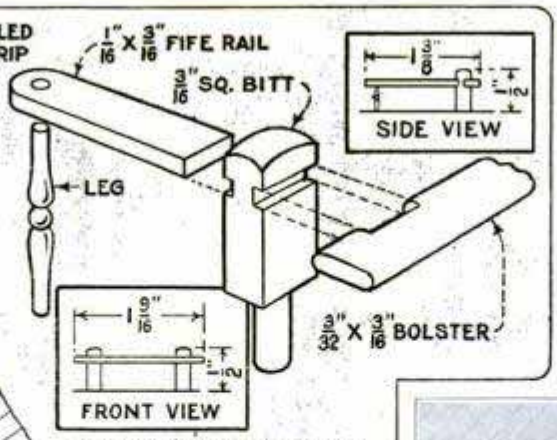


the deck. Between the foc's'le ladders and the rail, on each side, glue on small pieces of 3/16-in. wood (Fig. 60) to carry belaying pins for the head sheets. These will be explained later.

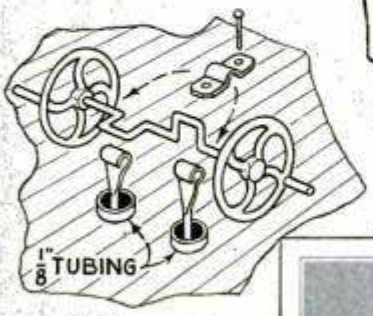
Around the fore and mainmasts are what is known as bitts and fife rails, Fig. 63. The drawing gives full dimensions for these. They are painted gray. The after end of the main fife rail carries a pump (Figs. 64 and 66), and the making of this is a nice little job. Get a tin-can lid, 4 or 5 in. in diameter, cut a strip of asbestos paper to the same width as the lid depth, then roll the strip up tightly and force it into the lid. This forms a soldering block, and small pieces can be held in position for soldering on it by means of straight and bent pins pressed down into the asbestos. To make the pump flywheels, form two rings of No. 20 copper wire around a 9/16-in. dowel, then cut four pieces of No. 24 wire and bend them S-shaped, to fit inside the rings and form the spokes of the wheels. Pin them down on the block and solder, attaching at the same time two short pieces of wire to the rims to form the wheel handles. Bend the crankshaft from a length of No. 20 wire, and carefully solder the hubs of the wheels to each end. Cut off the heads of two stout pins, flatten the ends for about 1/8 in. and bend them around the cranks to form the pump connecting rods. Drill two holes in the deck on the same centers as the cranks, and drive in two short pieces of 1/8-in. brass tubing, letting them project 1/16 in. above deck. Place the pump cranks in position on the fife rails and fasten them with two little bearings made of shim brass. Paint the rods, crankshaft, wheel rims and handles green and the spokes red, and varnish.

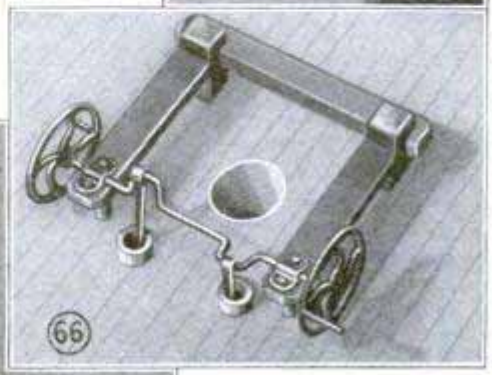
The deckhouse, Fig. 69, is made in exactly the same manner as the coach house, but the block is 5 by 2¼ by 1 3/16 in. in size. The galley funnel goes on the starboard (right) side, forward, and the spare spars on the port, lashed down to the boat skids. The boats are carved from white-pine

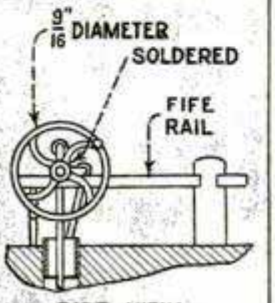


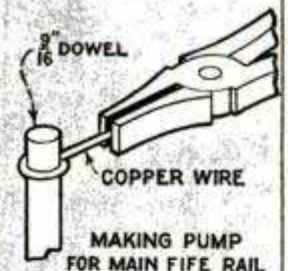


BITTS AND FIFE RAILS
Fig. 63

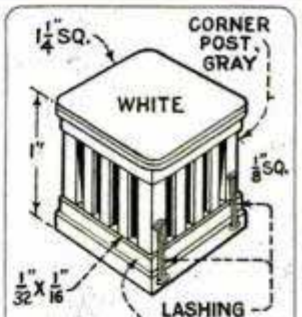


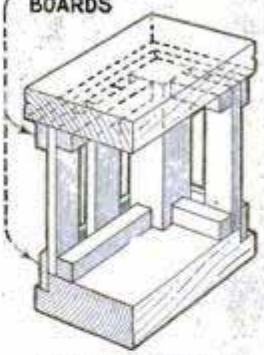




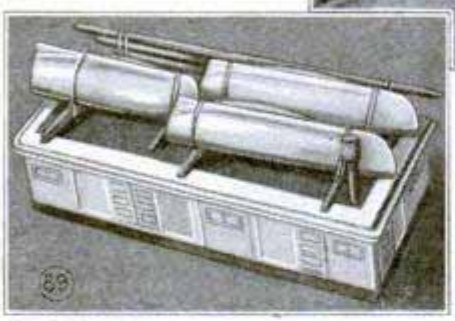


MAKING PUMP FOR MAIN FIFE RAIL
Fig. 64





FORE HATCH AND COOP
Fig. 67



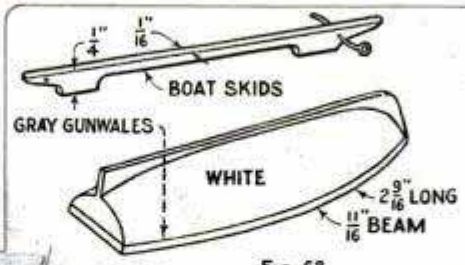
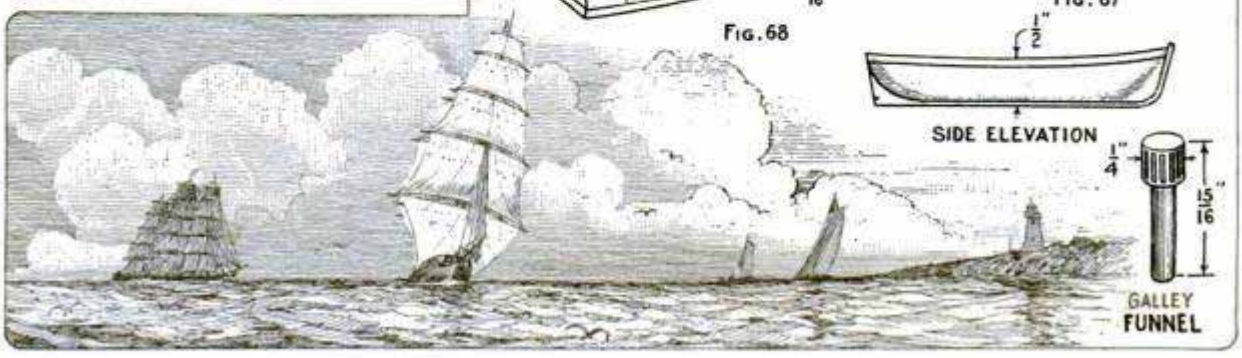


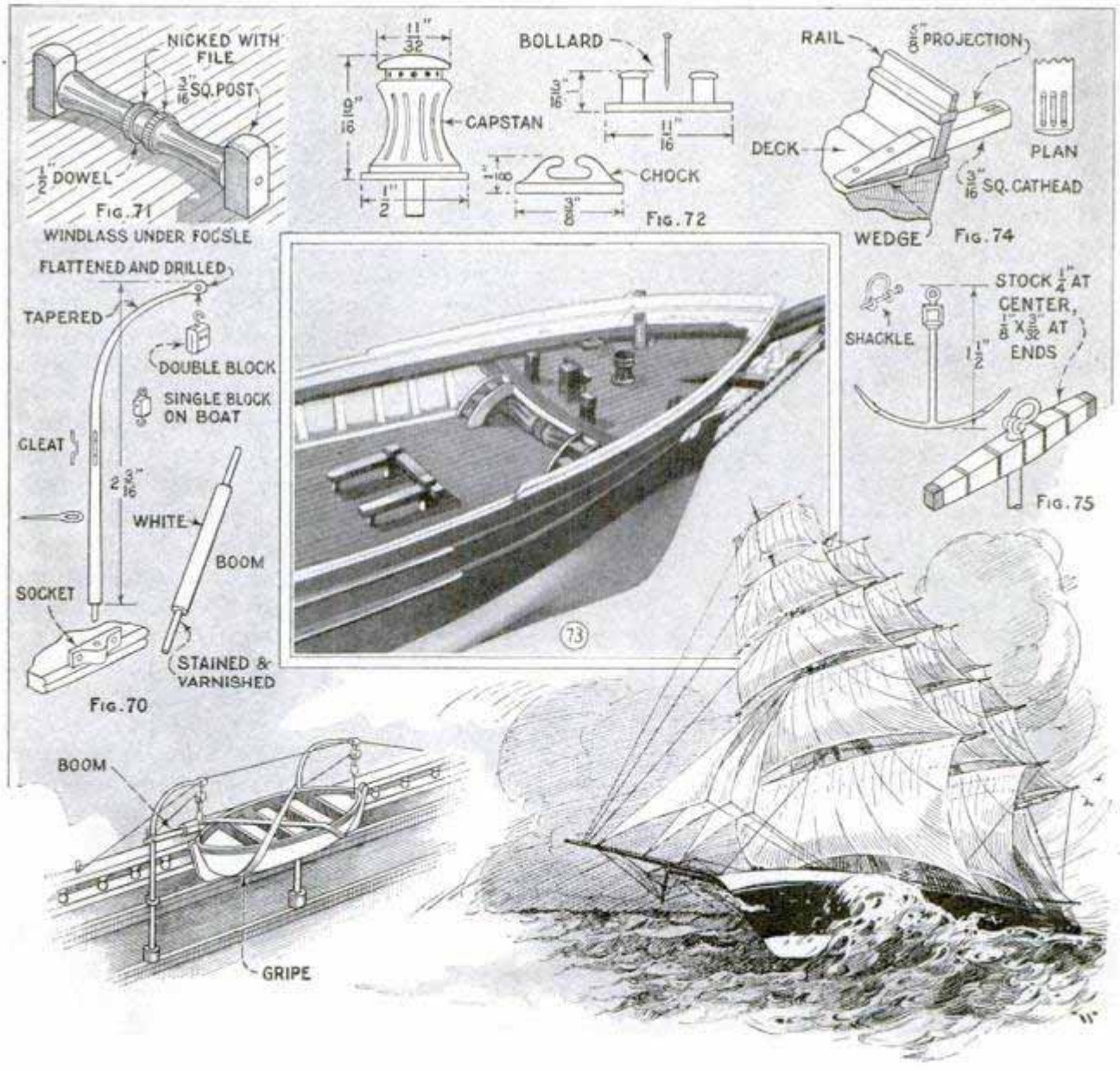
Fig. 68

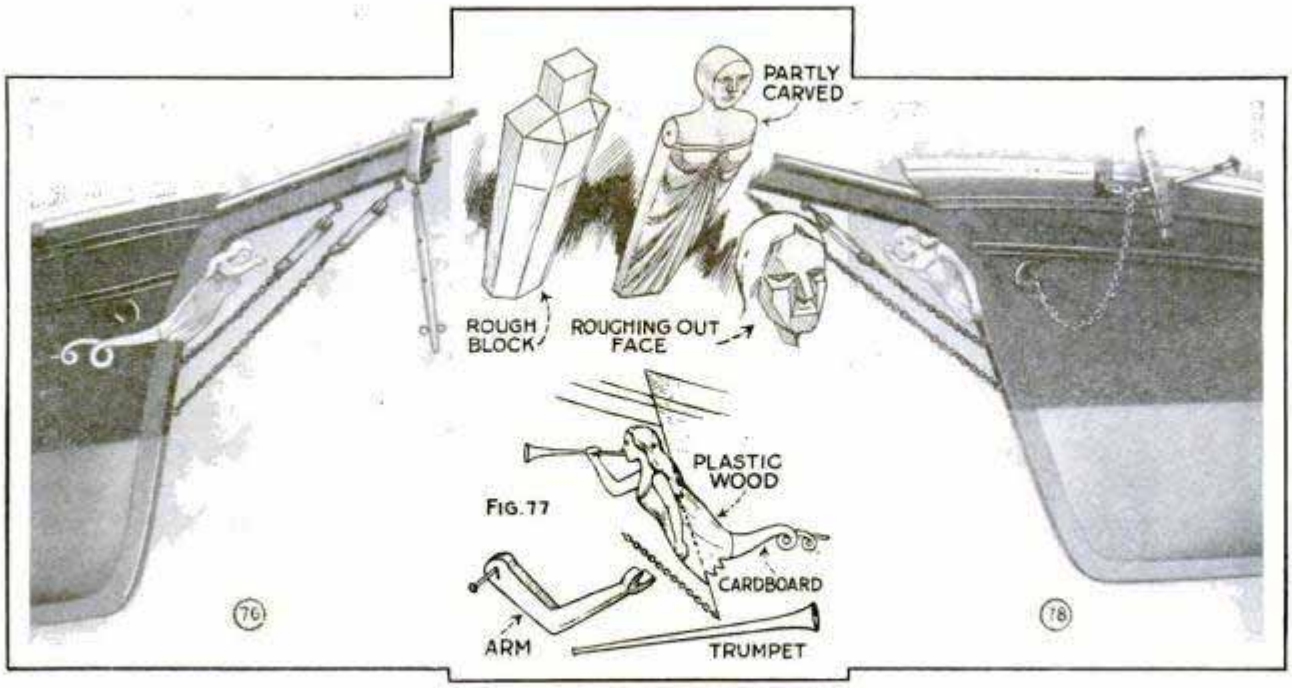


blocks, painted white with gray gunwales, and are lashed to eyepins made of fine wire, on the skids. Sliding doors are cut from bristol board and panels inked in. The fore hatch has a chicken coop lashed on top of it, as shown in Fig 67; for the model, the whole structure is a unit, and the lashings are merely for show. The hatch is 1¼ in. square and ¼ in. high: other dimensions are given in the drawing. Paint all white except the corner posts, which are gray.

The windlass, Fig. 71, is turned from a ½-in. dowel, and is 2½ in. long over all. Its position is shown in Fig. 73. The capstans, of which there are four, can be turned from dowel stock, as shown in Fig. 72, or purchased. This applies also to chocks and bollards.

The davits on the starboard quarter, shown in Figs. 55 and 70, are made from 3/32-in. brass wire. They taper from the bottom to top, and are flattened and drilled at the top for a double block. The bottom pin ends fit into small wooden sockets, pinned to the hull just above the lower molding, and they are further supported by eyepins driven into the rail at the upper molding. A small wire cleat for belaying (making fast) the falls of the boat tackles is soldered to each. Paint black below the rail and white above. The quarter boat is double-ended, 2½ in. long and ⅞-in. beam, carved from white pine, inside and out, and fitted with bristol-board thwarts (seats). Paint white with gray gunwales; brown thwarts and inside. Make the boom shown from 3/16-in. dowel, and lash across the davits. The gripes are made by doubling adhesive tape over





a small thread, then trimming 1/16 in. wide, and are used to hold the boat firmly against the boom. The single block at each end of the boat hooks into an eyepin.

The catheads, Fig. 74, are stout square timbers projecting from the bows, and are used to hoist the anchor up to the rail. On the model, they are fitted through the rail, as shown, at right angles to the hull, and project 5/8 in. outside and 3/4 in. inside the rail. Paint the inside part gray and the outside black. The outer end has six small holes drilled through it, to represent the sheaves. The anchor is shown in detail in Fig. 75. This can be purchased, or made in any way that the builder desires. The wooden stock is usually fitted by gluing two strips together with the anchor shank between, the stock being carved to shape when the glue has set. Paint the anchor flat black, stain the stock, paint on the black bands and varnish the stock. The anchor shackle is bent from copper or brass wire and the anchor is fitted with a double block. The lead of the tackle runs from an eye on the anchor block through the forward hole in the cathead, down through one hole in the block, up through the next hole in the cathead, down through the block again, through the next hole in the cathead, then through a hole in the rail, and is belayed around a bollard on the deck aft of the cathead. (See Fig. 73.)

The carving and fitting of the figurehead is a delicate job, although not such a hard one with a little patience. The writer is a very poor wood carver, but he managed to make a fairly decent-looking figurehead in about an hour by the method shown. Cut the block, which should be of hardwood, to the shape shown in Fig. 77, 1 3/8 by 1/2 by 1/2 in., then proceed to carve the face roughly by means of angular cuts somewhat as shown in the detail: the features can be rounded and fixed up afterward, the main thing at first being to get in the bold outlines of the face and body. Fit the carved block to the stem, then cut the arm that holds the trumpet (the right) roughly to shape, trying it often to the body to see that it is going to hold the trumpet in the correct position, which should be parallel to the bowsprit. When correct, round off the curves of the arm and body and pin and glue all in place. Add the hair to the figure with plastic wood or gesso, as desired, and make the trailing tail of bristol board, gesso or plastic wood. The figure is white, and the trumpet, made from a toothpick, is gold. The trumpet is better left until the model is finished, however, or it may be knocked off.

The hawsepipes, through which the anchor chains pass, are made of 1/4-in. copper tube, with the end cut on a bevel to suit the holes drilled for them in the hull. The outer beveled ends have washers soldered on, filed to elliptical shape and rounded. The rims of the pipes are black and the inside red. The anchor chain is fourteen

links to the inch, fastened inside the hawseholes by means of a pin driven into the hull, and shackled at the other end to the anchor. (See Fig. 78.) The rudder chains, shown in Figs. 50 and 55, are of the same size. They are fastened to an eyepin at the water line on the rudder, then led up, on each side, to an eyepin at the lower molding, leaving a little slack, then forward to another eyepin, 2 in. forward of the first, where they are made fast.

A word as to the painting of the deck fittings: The deck houses where white is used, look best when finished in egg-shell-gloss enamel, and metal parts, like the pump, when painted and varnished, but the anchor, bitts, fife rails, tops of houses and the like, finished in gray or black, look best left flat. Paint all chains black; chain of this size comes in brass, and of course it was iron on the original ship, so don't let the brass show.

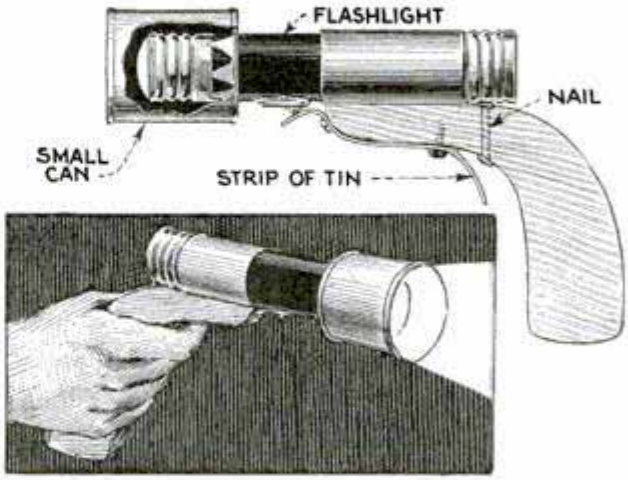
There is difference of opinion as to the best method of finishing the hull paint. It can be varnished and rubbed down, if desired, but the author does not like this; it makes the model look too much like a toy yacht, and not what it should look like, a picture, in wood and metal, of a real ship. The japan paint, when rubbed with a soft rag with or without just the slightest trace of polishing wax, takes on a soft, dull glow that is very pleasing, and that looks a great deal more like a real ship's paint than the varnish finish. If the wax is employed, only the very slightest trace must be used, and the first rubbing must be done very lightly, or the wax will lift the paint right off.

Those who do not wish to carve the figurehead can purchase it cast in metal. The location of the deck fittings is shown on one of the blueprints of this model, obtainable from the Amateur Mechanics department at 50 cents for the set of three.

(To Be Continued)

Flashlight for Signaling

Secret signaling at night can be accomplished by means of a flashlight gun of the kind shown in the illustration. All that is needed is a piece of soft wood, some tin cans, some wire, nails and a flashlight. Cut a small hole in the center of the bottom of a tin can and make radial cuts from this hole toward the side. Turn the pieces inward so that the head of a flashlight can be pushed through the opening, the cut sections "pinching" the flashlight to keep



Using an Ordinary Flashlight to Make a Signaling Gun; It Is Operated by a Trigger

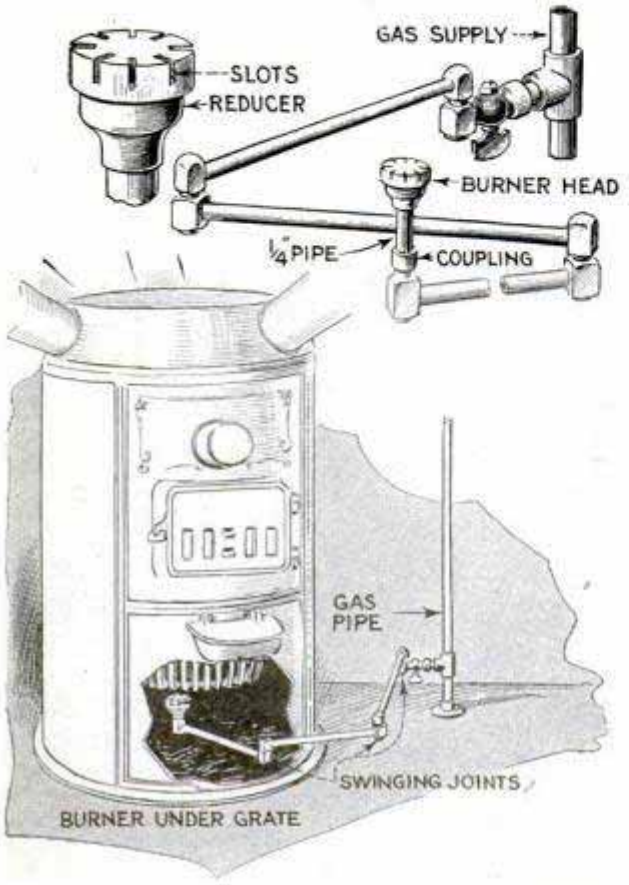
the can on securely. Cut another piece of tin from a can and bend it to form a tube, which fits around the flashlight, and nail it to a wooden handle shaped like a pistol grip. Arrange a strip of tin tacked to the underside of the grip to serve as a trigger. This should touch the push button on the flashlight. A hole is drilled for a nail, which is driven up through the handle to bear against the back ferrule of the flashlight, and so that the trigger strip can be pressed up against the nail head. The gun is pointed in the direction of the person who is to receive the signal and the flashes are made by pressing the trigger.

Coil Spring on Ford Brake Lever

On Ford brake levers the spring often becomes defective and troublesome. A good method of overcoming such trouble is to use a screen-door coil spring, which is attached to the brake lever, as indicated in the accompanying photo. The spring is slid over the rod attached to the ratchet pawl, and is fastened at both the top and the bottom.—A. K. Hinkley, Rowley, Massachusetts.

Lighting the Furnace by Gas

One of the simplest methods of starting a furnace fire, by other means than



Lighting the Furnace Fire by Means of an Extension Gas Burner

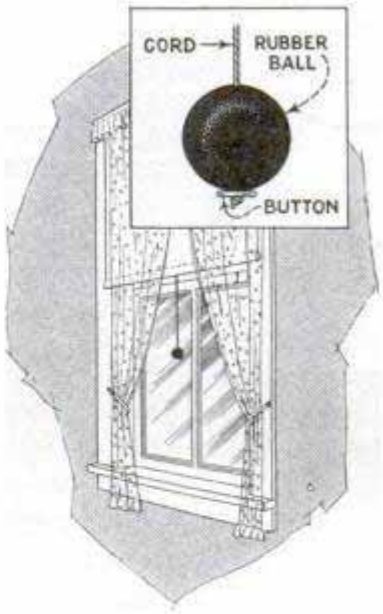
that of newspapers and kindling wood, is the use of a gas flame. Where gas is in the house it can be used as illustrated. Pipe the gas line down to within about 3 ft. of the ash-pit door at one side. Fit the end of the pipe with a swinging joint. Attach a 2-ft. length of gas pipe to this joint and also provide it with a swinging joint. A third and fourth section, the last fitted with a gas burner, is attached to the second length. The burner can be made after the pattern shown and consists of a short piece of ¼-in. gas pipe with a coupling on the bottom end to fit the burner threads in the end of the bracket. To the top end of the pipe fit a reducer coupling with a top diameter of ¾ in. and to that fit a pipe cap with about a dozen slots sawed through its edge. To use the burner, open the lower draft door and swing the burner inside the ash pit under the grate bars. Turn on the gas and light it in the usual manner. The flame will quickly ignite large kindling, or will even ignite the coal itself if left burning long enough. After the fire has been started, swing the bracket out.

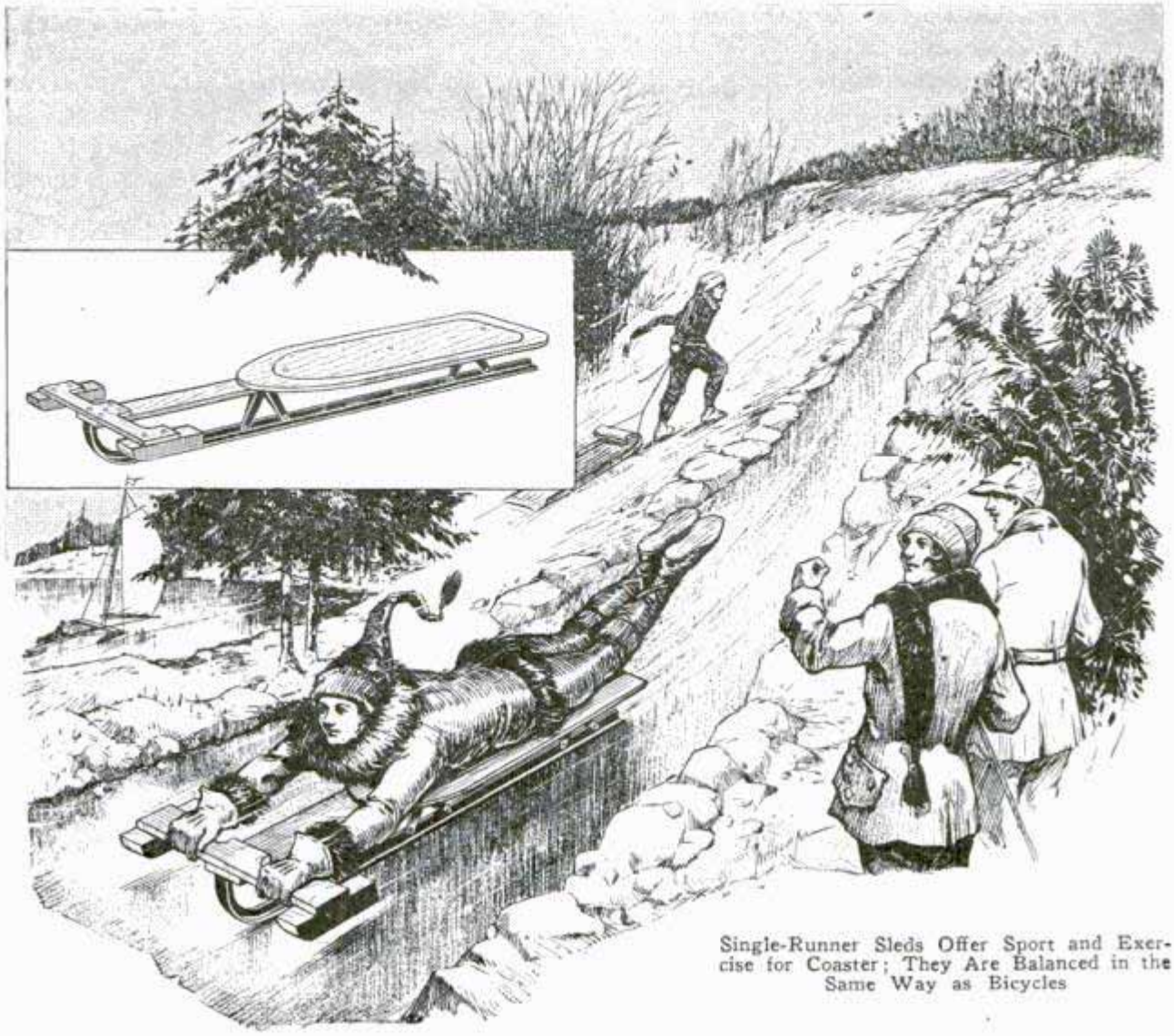
Rumble in a Closed Car

"What makes the rumble in a closed car?" is a question many car owners have tried to answer. One owner tightened down the body brackets, used rubber under some of the body supports and even screwed down floorboards with heavy wood screws in an effort to rid a car of the pronounced noise. Finally he cushioned the floor mats with a double thickness of felt, as used under rugs, with most gratifying results. The rumble was absent from the car for the first time since it left the factory. Felt as used for floor rugs is quite inexpensive, is easily cut to the required size and can readily be inserted under the floor mats. A double thickness has, in addition, good insulating qualities and adds to the life of the mats.—G. A. Luers, Washington, D. C.

Protectors for Window Shades

Nearly everyone has had the experience of window shades flying out of their hands and wrapping around the roller. This in time will cause the shade to tear. An easy method of overcoming this annoyance is to get a small soft rubber ball of the solid kind and attach it to the shade, as shown in the drawing. Take a large darning needle and thread it with good strong cord. A two-hole button is tied at the end of the cord and the cord is then pulled through the ball. The cord is tied to the lower part of the shade in the usual way. —William C. Thomas, Chicago, Ill.





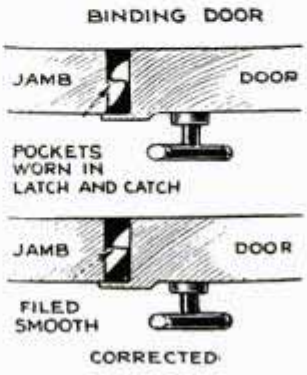
Single-Runner Sleds Offer Sport and Exercise for Coaster; They Are Balanced in the Same Way as Bicycles

Single-Runner Sleds

Balancing like a bicycle on account of its speed, a single-runner sled affords both amusement and exercise. The runner should be of the flexible type and can be taken from any discarded sled so equipped. It is fastened to a length of 1-in. wood, 3 in. wide and the same length as the runner, by means of brackets and bolts, or rivets. A crosspiece or handlebar, made of the same material, is securely nailed to the front end, and blocks of wood, rounded at the front ends, are nailed to the bar as indicated. The body board is then nailed on. It is about 2 ft. long, 1 ft. wide and is made of 1-in. stock. It is nailed in such a position that the rider's arms will extend straight in front of him to the handlebar. When starting, the sled is balanced by the user's toes, but once under way, it will be found possible, after practice, to balance the runner almost entirely by slight movements of the body and legs. This balancing is a bit difficult but not more so than mastering the riding of a bicycle.—L. J. Lesh, Miller, Ind.

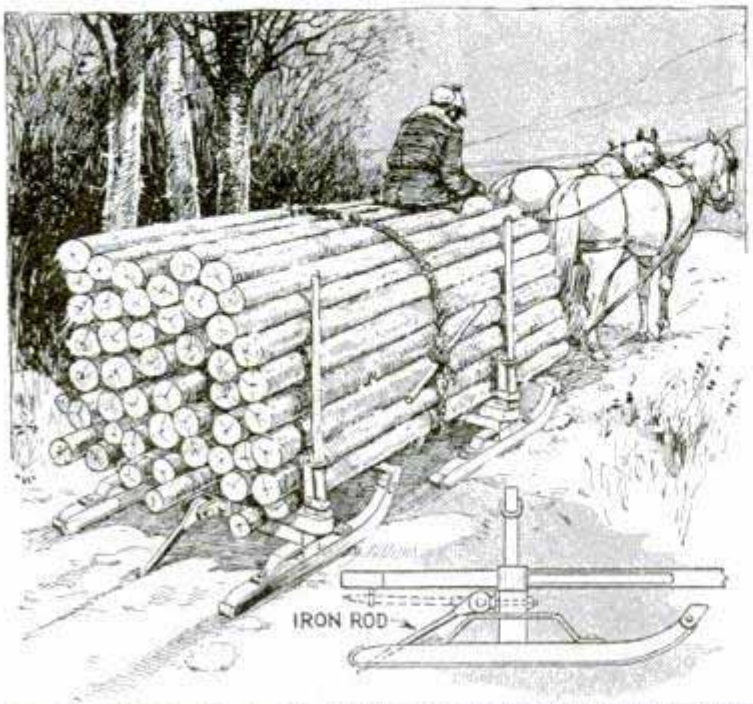
Correcting a Binding Door Latch

Auto doors sometimes stick on account of the latch and catch being worn to the shape shown in the upper detail. This can readily be remedied by filing off both, leaving a straight surface, slightly beveled. The spring behind the latch pushes it into place snugly, preventing rattling, and the slight bevel will allow easy turning of the door handle.—Richard C. Tarr, Gloucester, Mass.



Brake for Sleighs

A heavily loaded sleigh climbing a steep hill is a dangerous thing to ride on, espe-



Simple, Effective Brake That Will Prevent Heavily Loaded Sleighs from Slipping down Steep, Slippery Inclines

cially if the road surface is slippery, or if the horses are tempted to pause for a breath. Many a teamster has had a spill or a serious accident, which could have been avoided if there had been some means of braking the sleigh. The drawing shows an effective brake. It consists of heavy iron rod fastened to the center of the rear bob by means of a bolt through one end, to allow a free up-and-down movement. The other end is sharpened. When the sleigh is drawn up a hill, the bar drags over the snow, and when the sleigh stops, a backward movement of an inch or two causes the point of the rod to dig into the road. A hook may be provided to hold the rod up when not needed.—H. Webster, Winnipeg, Can.

Repairing Hood Roll Edges

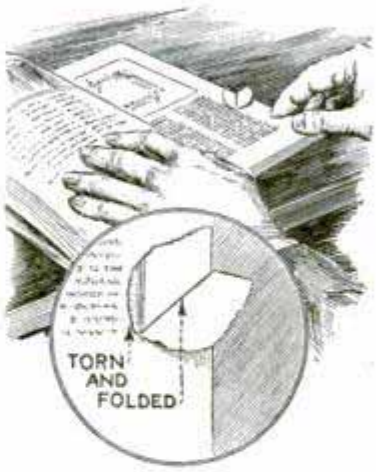
Late-model Ford cars have hoods with hollow, rolled edges on which the hood fasteners catch. The fasteners wear partly through the roll edge and are difficult to release when the hood is to be opened. A good method of preventing this trouble is to cut lengths of heavy wire, about 6 in. long, and drive these lengths into the roller edge from the ends. This fills the worn spots, forcing the hood fasteners to rest on the top of the roll. The 1927 model Fords have a leather pad over the rear end of the hood at the lower edges, and a long piece of wire the whole length of the hood must be driven in from the front end, instead of two short pieces from both ends.—E. T. Gunderson, Jr., Humboldt, Iowa.

How to Clean Silver

There is probably just as much silverware sold today, which contains a great deal of filigree work, as there ever was, and some of it is very difficult to clean. However, this can be done in the following way: Make a paste from cream of tartar and water and rub it into the filigree work of the silver. Then wrap it up in a soft cloth and lay away for a day or two, after which it should be well washed with warm water. The appearance of the piece will be like new. —L. H. Georger, Buffalo, N. Y.

Simple Page Marker

Turning down the corner of a leaf to mark the place in a magazine has the disadvantage that it is often difficult to find later and if several are turned down, one or more are likely to be overlooked. A better method is to make a semicircular tear in the sheet and then fold the torn section down so that the flap forms a tab projecting beyond the edge of the page, as shown in the illustration. By making these tears at various heights up and down the page, a large number of such markings can be made and each will be readily visible.



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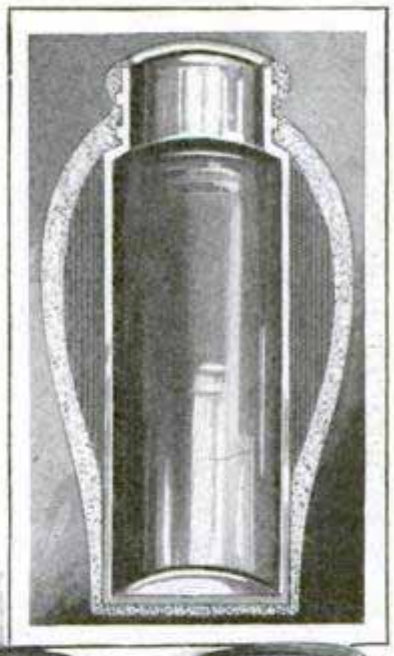
Artistic Homemade Vases

By DICK HUTCHINSON

MANY expensive decorative vases are made of either plaster of paris or a similar composition, which will not resist moisture, and they are therefore not suitable for holding cut flowers. The writer, however, has developed a method of producing artistic vases in gesso, which may be made at home during spare time, will add materially to the decoration of the home, and, above all, are capable of holding water.

The materials used for this interesting work are a few old large-neck bottles, fruit jars, or similar containers, a small can of liquid glue, a quantity of whiting, a small bottle of linseed oil and an old knife. Get an old air-tight tin can and pour into it a small quantity of the glue. Stir enough of the whiting into this to make a stiff paste, then add a few drops of linseed oil. If this mixture is too thin after stirring it thoroughly, add a little more of the whiting. Keep the mixture covered when not in use as it dries very rapidly. Now select a large-neck bottle to be used as a foundation upon which to build up the mixture. Cut a number of narrow strips of fairly heavy paper, and wind these around the body of the bottle, near the top, as shown in the sectional view above. Use plain glue to hold the paper in place. A little work, of course, is necessary to build up a sufficient shoulder of paper.



Artistic Vases for Cut Flowers Can Be Made by Using Gesso, with a Fruit Jar, Bottle or Other Container as a Base; Upper Right, Sectional View of Vase

Now begin at the top of the bottle and apply with the knife enough of the composition to form a collar, bringing the material over the top and to the inside edge of the neck opening. Work on down over the paper shoulder, applying the mixture until the desired shape has been obtained. Select a stick or large cork that will fit into the neck of the bottle rather tightly, and invert the bottle, then work on down and over the bottom with the mixture. If a smooth finish is desired, wet the knife occasionally by dipping it in water and work over the entire surface until it is perfectly smooth.

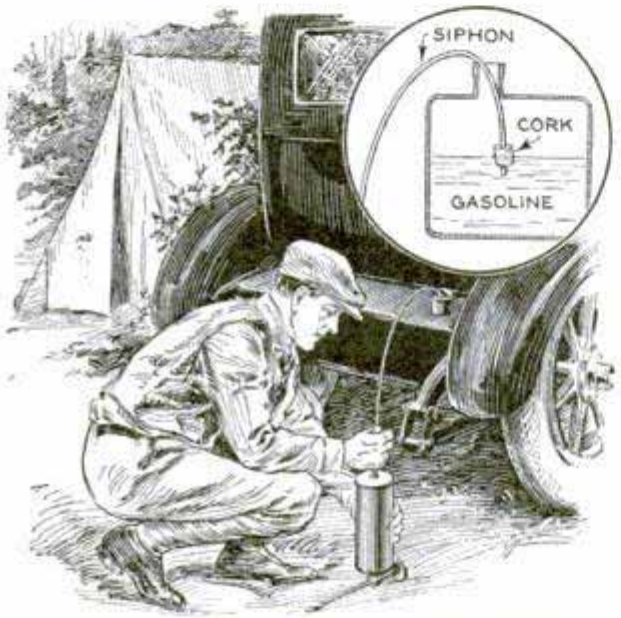
If the vase is to have a handle or handles, as in the left-hand example, bend short pieces of wire to the required shape, tie these in place on the bottle with a length of cord, apply a small quantity of the mixture at both ends of each wire and let it set until dry, then cover with the composition until the handles are of the required size and shape.

There are a great many methods of finishing vases. They may be given a coat-

ing of brush lacquer of any color most suited to the particular style of vase selected and a medallion painted on, or a coat of gold bronze may be applied over the surface and some old rose, burnt umber or green oil paint then rubbed on with a piece of cloth. This will produce a very pleasing effect, which will fit in well with any plan of decorating. With a little originality and practice, one will be able to work up a variety of very beautiful pieces.

Floating Siphon Insures Clean Gasoline

Many tourists, particularly those of the motor-camper class, use a rubber-tube si-



Cork on End of Siphon Prevents Getting Sediment and Water Out of Auto Gas Tank

phon to fill the tanks of their camp stoves or gasoline lanterns. Clean gasoline is essential to the proper operation of any gasoline-heating unit. Dirty gasoline containing water is often caused by the end of the siphon tube extending down to the very bottom of the gas tank of the car, which permits it to suck up some of the sediment and water accumulated there. This trouble is avoided by attaching a large cork, which can just be slipped through the filler hole of the tank, to the siphon tube, about an inch or so from the end. The tourist is then always assured of getting clean gasoline.

Eliminating the Ash Sifter

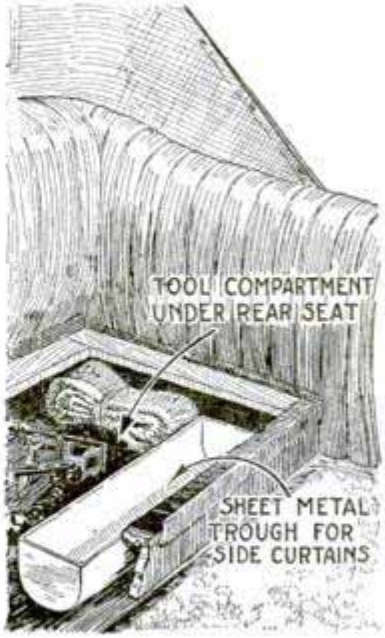
Screening and sifting coal ashes from the furnace, while essential from the standpoint of economy, is a most disagreeable chore. This messy task is eliminated in a most effective manner, however, by the employment of a short-handled garden rake. When the ashes have been shaken down into the ashpit, the door should be left closed long enough for the dust to settle. The rake should then be used to push them toward the back of the pit. With a little care, the partly burned coals can be raked from the pile to the front of the pit and shoveled into the fire box again. Besides eliminating the use of a sifter, this practice prevents dust and dirt, especially if the fire-box door is left open and the check draft closed during the raking, as the draft carries away practically all dust that rises from the pit door.

Gravy Spots on Linen

Gravy spots can be removed from linen table cloths in the following way: Set a saucer under the spot and pour some peroxide over the spot immediately. Then soak it with a little ammonia. The ammonia is not always necessary, but in some cases it is essential in removing all traces of the marking.

Metal Trough Holds Auto Curtains

While many forms of holders for side curtains of the car are available, the majority of these are arranged in the top, or at the junction of the top with the rear curtain. A practical and serviceable departure from these forms is used by a Washington motorist, and is shown in the attached illustration. A small metal trough is carried in the tool compartment under the rear seat. This is made from sheet iron and is securely screwed to the forward ledge of the



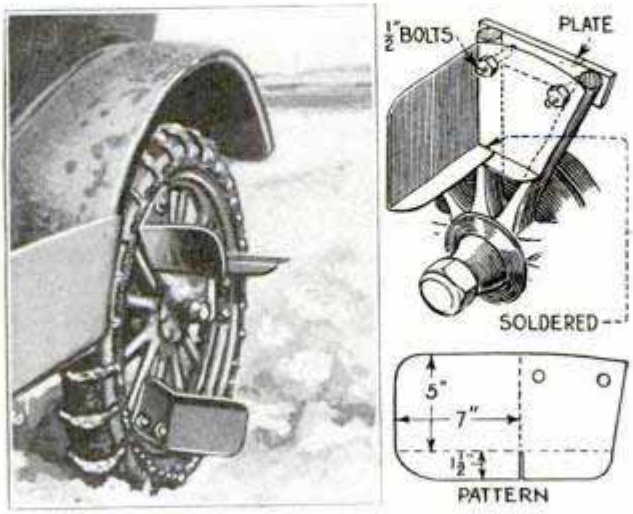
box, where it is easily accessible. The holder is made of a size to accommodate the rolled bundle of side curtains, but a few inches longer than the roll, to permit inserting the fingers. A cardboard lining should be used in the holder to avoid cutting or scratching the curtains.

Better Switch Plates

Wall-switch plates have been made from several substances. The trouble with most of these is that they soon become discolored and scratched, which naturally detracts from their appearance. Better ones can be made in the following way: Take some ¼-in. plate glass and cut some pieces to the same size as a regular switch plate, bevel the edges and cut the necessary holes for both screws and switch. Any glazier's shop can do this work quickly and at a small cost. They are then silvered as any mirror would be. These plates can be more easily seen than other kinds when the room is darkened because they reflect the least amount of light. They do not have to be replaced on account of becoming scratched or tarnished, and thus they last indefinitely. The material need be mere scrap glass.

Snowshoes for the Auto

In parts of the country where there is considerable snow during the winter months, it is often difficult for autos to get through. Chains do not give enough traction in loose snow. As a remedy we made sheet-metal snowshoes, which were securely bolted to the rear wheels of the car as shown in the photo. The shoes prevent the wheels from burying themselves in deep snow and provide sufficient traction. With them, we have driven through snow where other cars were unable to go.—A. C. Brundage, Rochester, Minn.



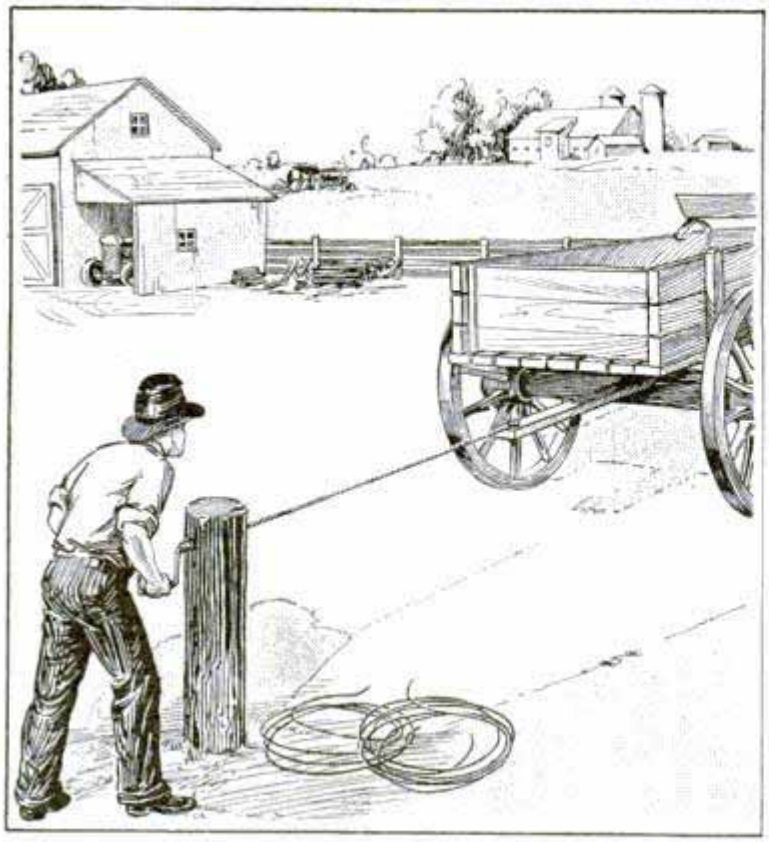
Sheet-Metal Snowshoes on Rear Wheels Help Auto Travel in Deep Snow

Novel Hat Pegs Consisting of Painted Dutch Dolls with Wooden Shoes

Dolls Make Attractive Hat Pegs

Vividly colored wooden dolls with shoes projecting sufficiently to allow their use as hat pegs, are the latest novelty in London. Any home mechanic can readily make them by cutting the figures out of ½-in. wood with a fretsaw. The extending shoes are securely attached to the feet with long wood screws, holes being drilled through the feet and lengthwise through the shoes to prevent splitting them. If a number of dolls are to be used side by side, as shown in the drawing, get a piece of ½-in. wood, about 10 in. wide and any desired length, draw the dolls on this piece and then cut out just the lower section of each doll. In the figures shown the shoes are attached directly to the underside of the part representing the dress, the screws being drawn up through the shoes and into the dress section.—H. T. Wilkins, London, Eng.

Small rubber rollers can be made by drawing strips through a hole in a hot metal plate.



Quick and Easy Method, Used by Wisconsin Farmer, of Twisting Four Wires into a Strong Cable

Twisting Small Wire Cables

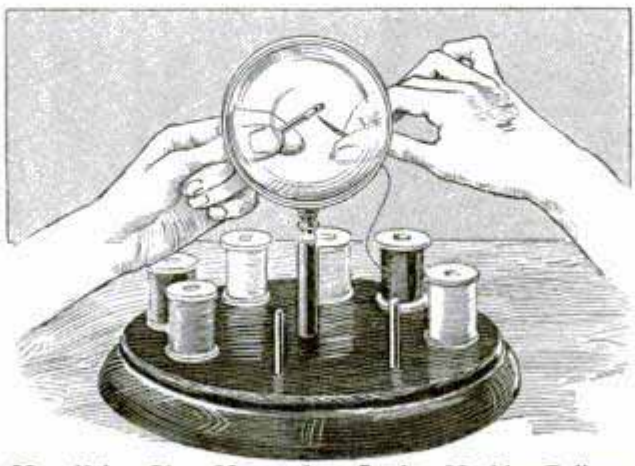
One chief difficulty in twisting wires to make three or four-stranded cables for fence-post braces is to make allowance for the shortening of the twisted strands. A Wisconsin farmer used a simple and novel method of overcoming this difficulty. A hole about 1 in. in diameter is drilled through the upper end of a post which is set firmly in the ground. Four strands of wire are attached to the rear of a farm-wagon reach by means of a bolt, and the opposite ends of the strands passed through the hole in the post. These ends are bent to double back upon themselves an inch or so and then inserted into the jaws of a carpenters' brace where they may be gripped firmly. By operating the brace the four strands are twisted quickly and evenly, and the wagon is drawn slowly backward to allow for the shortening of the cable. A number of cables may thus be made in a short time as it is a simple matter to release a cable and substitute another set of strands.

Novel Way to Oil Clock

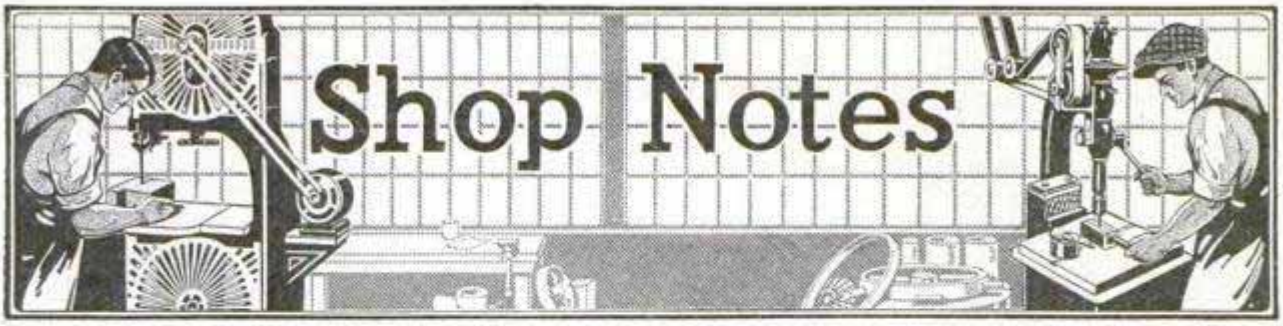
When the works of a clock are not easily accessible for oiling, the following method is always successful. Fill an atomizer with the type of oil desired and direct the spray into the region to be oiled. A very little oil will suffice. This method is particularly successful with alarm clocks. It is not necessary to remove the back of the clock; simply insert the tip of the atomizer in the slot occupied by the regulating device and the works, including the mainspring, will be well lubricated by three or four compressions of the bulb. By using an atomizer with a tip adjustable at different angles, the spray may be driven vertically upward into the works of the heavier type of clocks that are not so easily moved.—L. Pyle, St. Louis, Mo.

Magnifying Glass Aids to Thread Needles

Much unnecessary eye strain can be avoided by women who sew if the method shown in the drawing is used. A magnifying glass having a handle is needed, the size depending on the sewing stand on which it is to be used. A hole, the same size as the handle, is drilled into the bottom of the stand. The handle is then inserted in the hole as indicated. It is an easy matter to thread needles by placing the thread and needle behind the glass. Both will be magnified to such an extent that eye strain will be eliminated. —Wm. C. Thomas, Chicago, Ill.



Magnifying Glass Mounted on Sewing Machine Relieves Eye Strain When Threading Needles



All Shop Notes published in 1927, in book form—Fifty Cents—from our Book Department

How to Burn Coke in Stove or Furnace

By J. S. HAGANS

MANY householders have been attracted to the use of coke for heating at one time or another, because of its merits of cleanliness, minimum ash, smokelessness and other considerations, only to abandon the fuel in disgust because the results were not what they had expected. In practically every such case, the trouble was not due to the fuel, but to unfamiliarity with the proper method of handling it, and to improper management of the furnace or stove in which it was used.

In the first place, there are several sizes of coke, just as there are of coal, and, for greatest economy and service, the size must be suited to the kind of heating apparatus it is to be used in; the ordinary sizes are: mixed egg and stove, for furnaces, steam and hot-water boilers with very large fireboxes; stove (range) size, for furnaces, steam and water boilers, such as form the heating equipment in the aver-

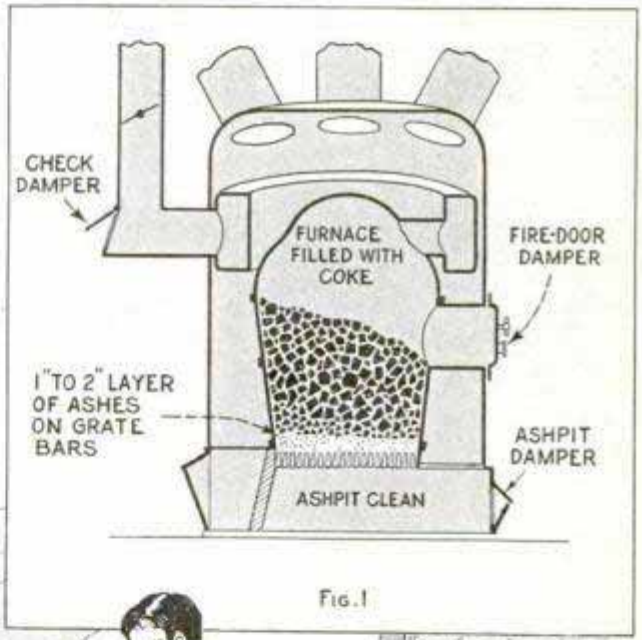
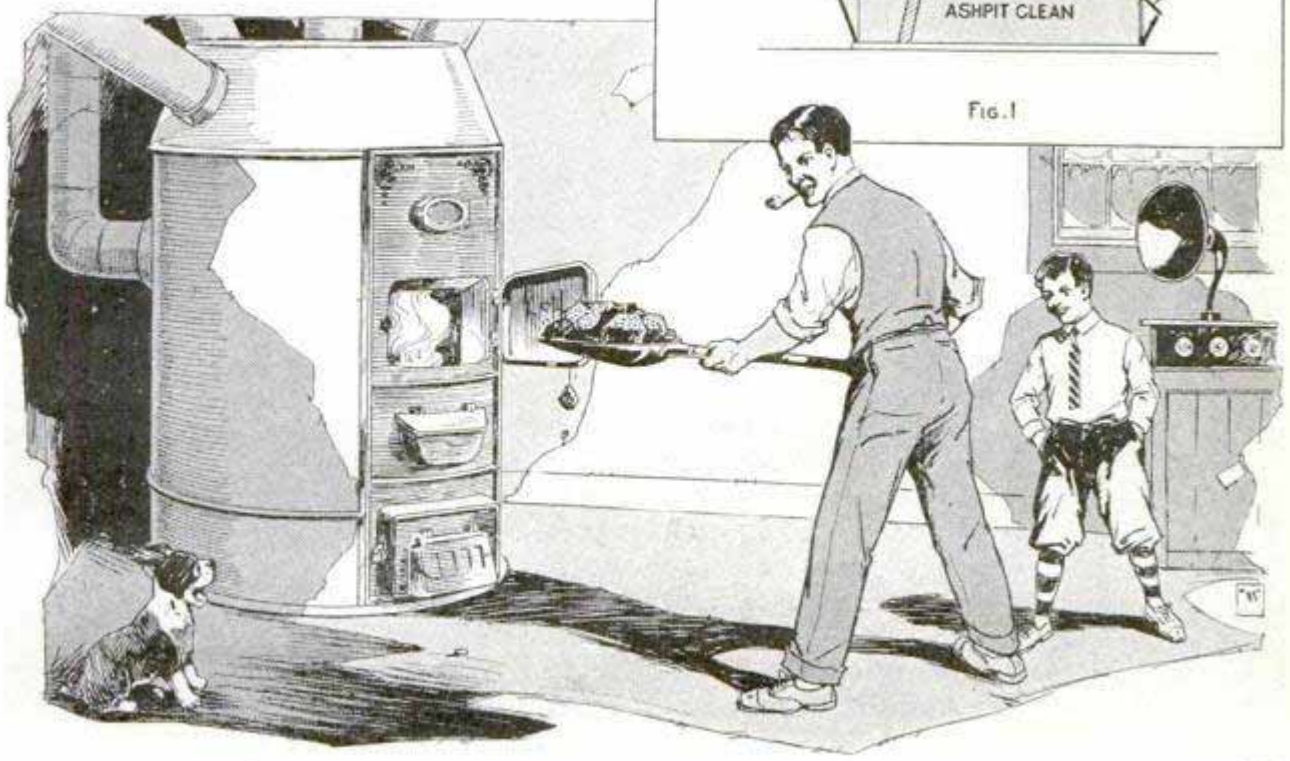


FIG. 1



age six to ten-room house; No. 1 nut, for small furnaces, boilers and open grates; No. 2 nut, for stoves and ranges, base burners, hot-water heaters and magazine-feed boilers and furnaces.

For use in furnaces, steam and hot-water boilers, after the fire is kindled fill the firepot with coke and close the fire-door and smoke-pipe dampers. Open the check damper (Fig. 1) and regulate the draft with the ashpit damper. It may be necessary, in some cases, to keep the smokepipe (twist) damper slightly open, but this is easily determined by experiment. When preparing the fire for the night, stir with the poker and open the drafts until the fire is burning brightly. Fill with coke and close the twist or smoke-pipe damper; open the fire-door and check dampers and, if necessary, open the ashpit damper slightly. Usually this damper can be kept closed.

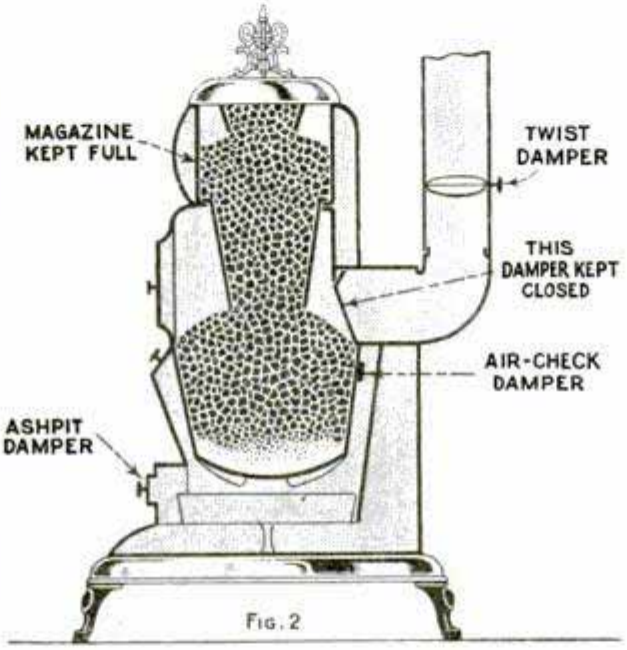


FIG. 2

In the morning the fire should be shaken only until the first red sparks appear in the ashpit. If the fire is low, don't shake it; stir it up from the top with the poker, throw on a few shovelfuls of coke and turn on the draft. When the fire is going well, fill the firepot with coke and regulate the drafts as before, or according to weather conditions. Should the fire occasionally go out, it is not necessary to dump it; dig a hole in the front of the coke and rekindle.

It is usually desirable to protect the bars of the furnace grate from the intense heat of the fire by allowing a layer of ashes to accumulate on the bars. In mild weather the thickness of this layer can be increased. Always keep the firepot full, since a thick fire, burning slowly, will generate more heat than a thin fire burning fast, and don't shake the fire more than once a day, preferably in the morning, except in severe weather, or when heat is required in a hurry.

When burning coke in a base burner or magazine-type of stove (Fig. 2), kindle in the usual way, then fill the magazine with coke. When well started, close the twist damper and regulate with the check, fire-door and ashpit dampers. A little experience will demonstrate that less draft is required with coke than with most other fuels. At night, open the fire door and poke so as to cover the fire with fresh coke from the magazine. Fill the magazine and regulate the drafts, and there will be a good fire in the morning. In the morning, shake gently until the first red sparks appear in the ashpit, after opening the drafts. When the fire has started nicely, close the smokepipe damper as before, and regulate with check, ashpit and fire-door dampers. If the fire does not burn evenly or freely, poke it.

To get good results with coke it is only necessary to experiment a little with the stove or furnace, basing the experiments on the foregoing hints. This is true not only with coke, but with every other fuel used for house heating; the heat units are there, and it is only a matter of determining how to get most of them into useful heat at the lowest cost, and to keep as many as possible from going up the chimney without performing their share in heating the house.

Snow Packs for Honey Bees

Putting bees in a snow pack out of doors has been found to be an ideal way to bring them safely through northern winters. Cases large enough to hold two hives, with space of 4 to 6 in. to spare, were built of boards and set out in the woods. In the late fall, hives were put in these and packed all around with dead leaves, with a foot or more of dead leaves on top. The cases were set facing east, to protect them from northwest winds. The leaves were

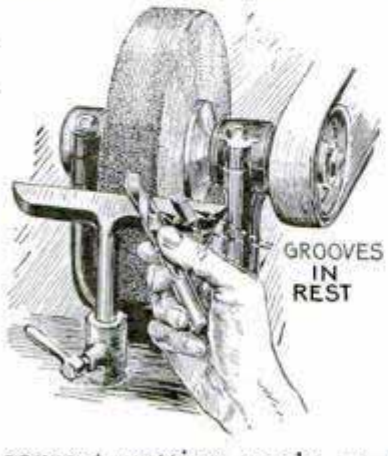
sufficient to keep the bees warm until snow came; then piles of snow on top and all around the cases served as a warm pack for the bees. Wintered in this way, they were found to come out in the spring in fine, hardy shape.

Drilling Holes in Lead

Every machinist knows what a difficult task it is to drill lead accurately. Large jobs cause considerable trouble, due to heated drills, which tend to stick, large burrs which form about the edges of the holes, and crawling chips, which tend to enlarge holes. The usual water lubricants, drilling compounds, kerosene, etc., are useless in such cases, but the use of good lard oil appears to be the solution for the problem. Use plenty of the oil and lift the drill out often during the drilling in order to clear the chips. A drill speed of between 800 and 1,000 r.p.m. has been found to give the best results.

Rest for Grinding Drills

I have had occasion to have a number of drills sharpened in small shops, and was surprised to note that in no case was the grinder operator supplied with any rest for holding the drill while doing the job. This method of sharpening a drill does not give an even bevel to the point and therefore the cutting is not performed by the entire surface of the point as it should be. In some instances there is but one edge cutting, the second having been ground down more than the first. I suggested the use of an ordinary rest having two V-grooves filed in the top at the proper angle to the surface of the emery wheel. A drill is placed in one of the grooves, and it can then be turned around while grinding, with assurance of having the correct cutting angle on the end.—Harry E. Gifford, Medford, Mass.



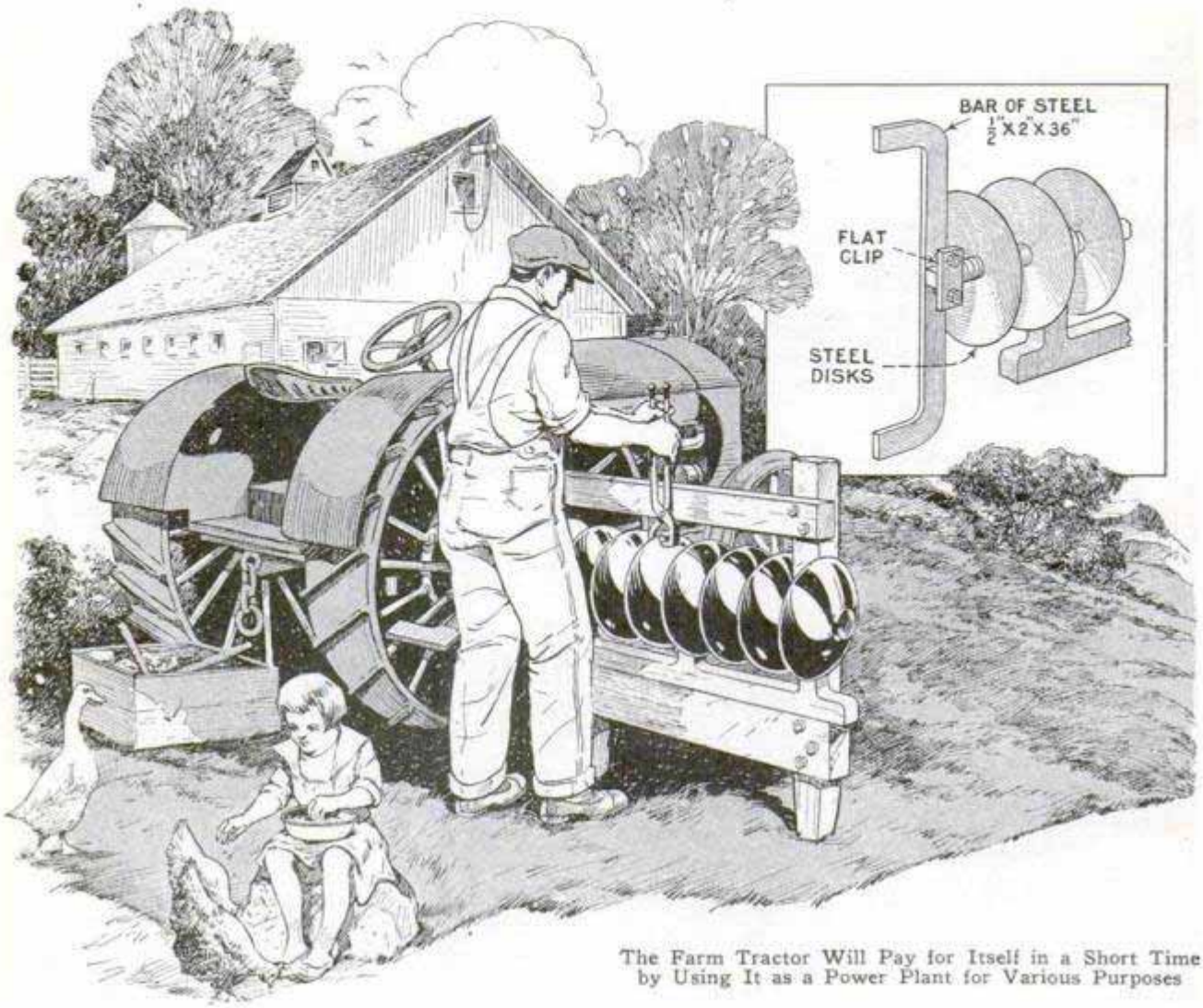
Auto-Wheel Spoke and Piece of Steel Plate Make Tool for Removing Mortar from Bricks

Chopping Mortar from Old Bricks

There are hundreds of brick buildings being torn down every year and contractors often try to salvage as much of the old bricks as possible. The photo shows a workman who made a brick hatchet out of a short auto-wheel spoke and a piece of ⅛ by 8-in. steel plate. The handle is split on the end for the blade and two screws hold the latter securely. This is a handy tool for chopping the mortar from the bricks and prying them apart. —Carlton Groat, The Dalles, Oreg.

How to Keep a Drawing Clean

Moving a T-square up and down on a drawing board over a sheet of paper tends to smudge the drawing. To prevent this from occurring, tie a length of string on each end of the board from top to bottom and the T-square will ride on them without touching the drawing.



The Farm Tractor Will Pay for Itself in a Short Time by Using It as a Power Plant for Various Purposes

Tractor Used to Sharpen Harrow Disks

Two years ago I purchased a harrow-disk sharpener. It was one of those arrangements in which you turn the harrow on its back, clamp a crank to one end of the shaft that holds the disks together, and, while one person turns the crank, another holds the sharpener against the disks. However, the job was not entirely satisfactory because of the lack of steady power delivered by the crank operator. Believing that a tractor could be used for this purpose, I made a device that coupled the harrow shaft to the tractor wheel directly, the coupling device consisting of a 3-ft. steel bar, 2 in. wide and ½ in. thick, bent as indicated in the detail and having a link attached at the center with two bolts for clamping it securely to the end of the disk shaft. Set the disk assembly on a heavy stand.—Geo. G. McVicker, North Bend, Nebr.

When Your Last Saw Blade Breaks

Did you ever have the only hacksaw blade break when working on a job away from the shop and where another blade was not available? Even if broken near the center, a blade can still be used. Dismantle the frame, and insert the broken end of the blade in the loose frame eye, wedging it with a bit of wood, as

Method of Using a Broken Hacksaw Blade

shown in the photo on the opposite page. If the blade is not used too strenuously small cuts can be made with it.

Repair on Gasoline-Tank Clamp

The bar that holds down the square gasoline tank on the older-model Ford coupes is held at the outer end by a wood screw, driven into the turtle-back frame. This screw often works loose and drops out, allowing the tank to vibrate on its supports. As the screw extends nearly through the wood frame, a longer wood screw cannot be used. A good repair can be made by using a small bolt through the turtle-back frame with the head on the outside. As the hole is directly above the tank, it is not easily drilled from the inside, though it can be done with a ratchet brace. A sharp-pointed punch can be driven through from the inside until a small dent is made in the metal on the outside of the turtle back. A hole for the through bolt is then drilled from the outside. A carriage bolt is good for this use and makes a neat finish on the outside. A bolt taken from a front-spring rebound clip is the right size.

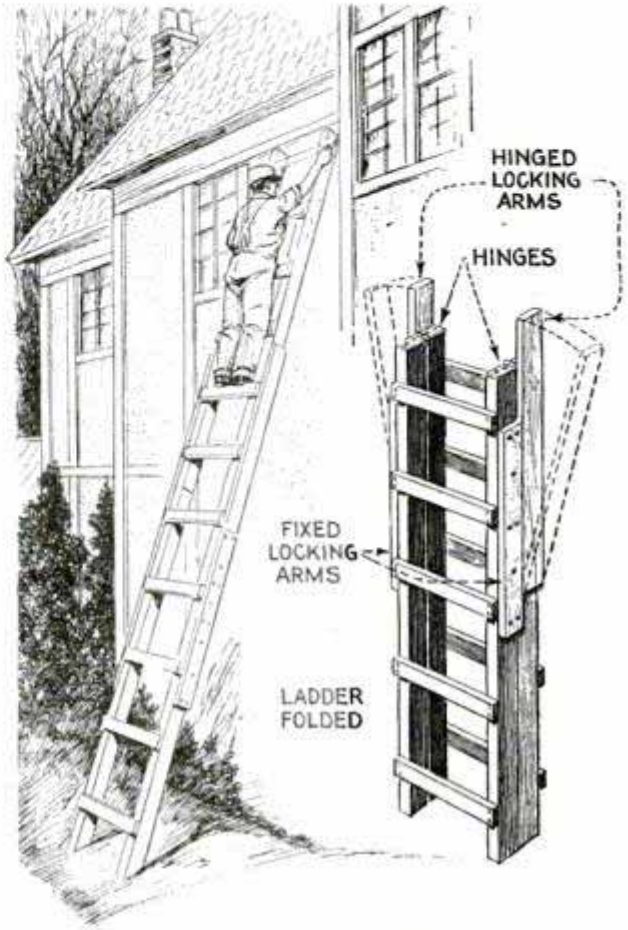
Keeping the Marking Brush Clean

The handle of a long marking brush is a hard thing to keep clean and free from paint in the average paint pot. Take a short piece of heavy hose, about 1½ in. to 2 in. long, and cut a deep angular groove in the top of it, as shown, to hold the handle of the brush. Split the lower end of the hose to fit snugly over the rim or edge of the pot. The brush handle is thus held away from the edge and will not get dirty or caked, nor roll around when the pot is moved.—Frank W. Bentley, Jr., Missouri Valley, Iowa.

¶A section of an old inner tube, with one end cemented shut, makes a handy water pail for the motorist.

A Safe Folding Ladder

It is not uncommon for building workers to nail together rough, temporary ladders



Folding Ladder Which Locks Securely to Provide Safety for the Worker

to suit their own requirements. For example, there are many occasions during building construction where a ladder is needed in some particular part but it is impossible to reach it because of narrow passages and sharp turns. In cases like this a folding ladder can be made up out of materials found about the job. Instead of nailing the steps to two long uprights as usual, make the ladder in two halves and join them together with two stout hinges. Thus the ladder can be folded double, making it easy to pass it through places where a solid ladder would not go. However, such a ladder might be dangerous in use and therefore locking arms are provided to make it safe. These consist of two wood strips nailed to each side and two wood arms hinged to each side. When the arms are dropped, the ladder is locked and they must be lifted again before the ladder can be folded.—Harry Moore, Montreal, Can.

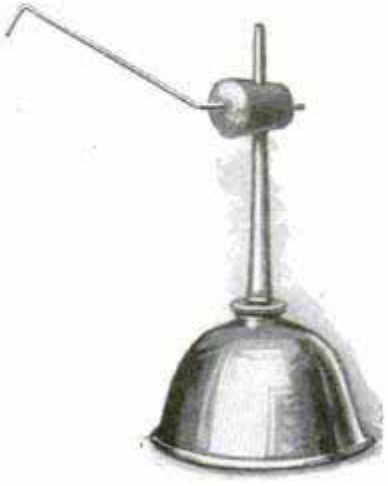
Convenient Truck Which May Be Made Stationary by Lowering the Legs

Truck Aids Moving Heavy Iron Machinery

The truck shown in the photo is constructed so that, by the use of a lever on the end, the guide wheel may be raised or lowered. When lowered, the truck rests on the two iron legs and becomes stationary. It is used for moving heavy iron machinery, but would also make a good portable bench.

Practical Improvised Surface Gauge

Many leveling or setting-up jobs encountered away from the shop can be done with an improvised surface gauge of the kind shown in the photo. The needle is simply a piece of wire forced through a heavy cork, which in turn is pushed down over the oil-can spout. The needle is easily moved up or down, yet it is firmly held by the cork. Of course, the tool cannot be relied upon for extreme accuracy, but it gives quicker and better results than the practice of attempting close work with a rule.

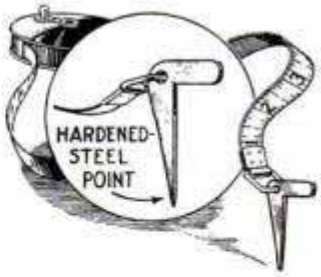


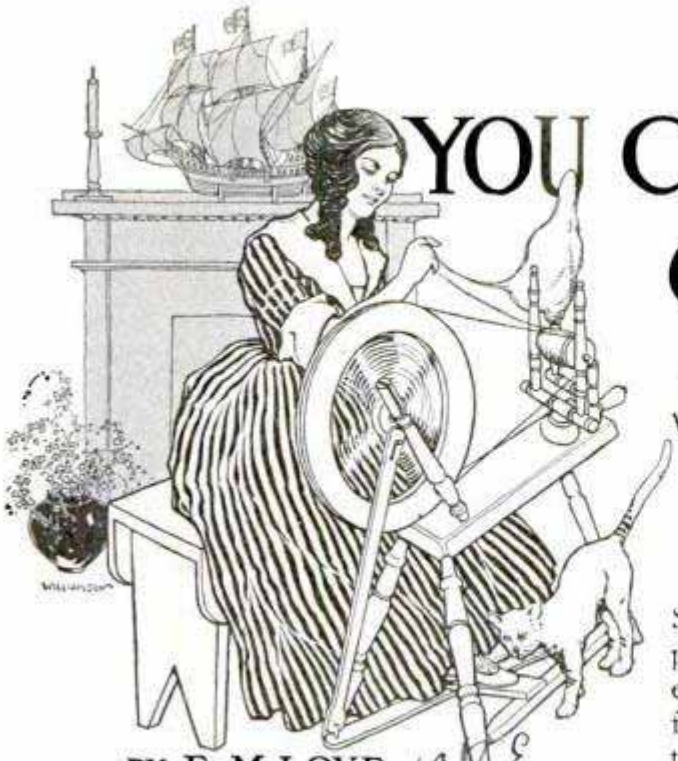
Sewers Plugged with Old Auto Inner Tubes

Old auto inner tubes are being used by plumbers and city sewer repairmen for plugging up sewer pipes while making repairs on them. Many tubes are ordinarily thrown away, due to a bad blowout, although the rest of the tube is in good condition. The good section of the tube is cut off and the ends vulcanized to make it air-tight. If the valve is on the discarded section it should be removed and attached to the vulcanized section. Balloon tubes are the best kind to use. While the workmen are engaged in repairing a break in the sewer, the inner tube is inserted in the end of the pipe and is pumped up with air, forming a "plug," which effectively holds back water and sewage while the repair is being made. This method has been successfully used on pipes up to 30 in. in diameter. Small inner tubes can be used for smaller pipes.

Pin Attached to a Measuring Tape

When one is obliged to use a 50 or 100-ft. measuring tape alone, it is more or less of an awkward job. A nail and a rock are about the only means of holding the ring at the end of the tape in position for running the tape, and even these anchors are not always secure. A real-estate man used the pin shown in the accompanying drawing. A piece of flat steel was ground down to the form of a letter "L," with the longer portion 1½ in. long. This was sharpened to a point and hardened. A hole was drilled in the elbow and the short end rounded. The ring at the end of the rope was opened, slipped through the hole in the pin and closed, after which the butting ends were soldered together. With the aid of this pin, the tape can be held at any point on a tree, building or wood surface.—L. B. Robbins, Harwich, Mass.



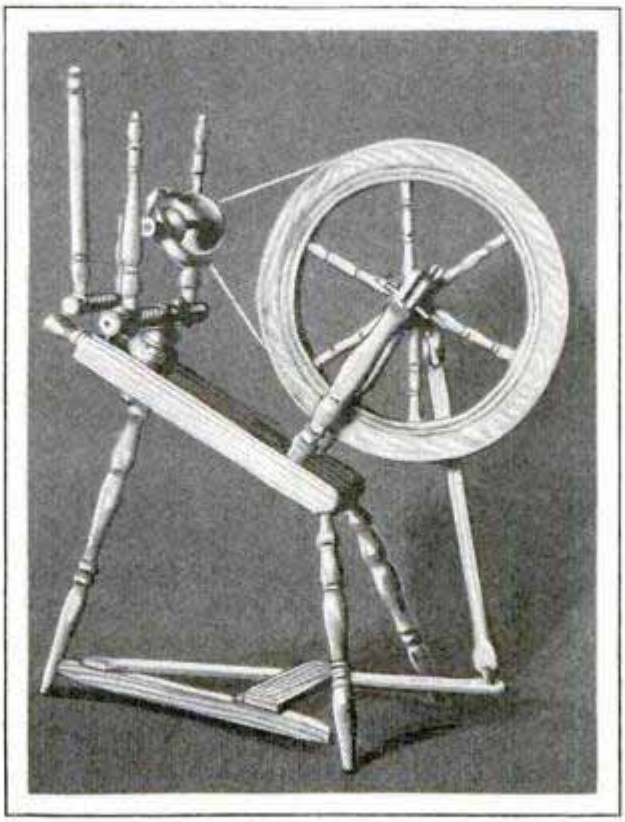


YOU CAN MAKE THIS COLONIAL SPINNING WHEEL

BY E·M·LOVE

SAVE in remote country districts, spinning has passed from the realm of household arts, outdistanced by machines that multiply hand labor a thousand fold. Yet an air of romance still clings to distaff and spindle, and the spinning wheel, celebrated in song and legend, takes its place in the modern home as a quaint reminder of an ancient craft and an example of early American furniture. Few people are fortunate enough to own a colonial wheel, but any handy man can make an excellent copy by following this article.

Most common hardwoods are suitable for material. Maple is perhaps the most desirable for the turned work, and oak or ash for the base, treadle and pitman. Glue up the wheel rim as a square frame from stock 1½ by 4¼ in. in the rough, the four pieces being 16 in. long. The ends are cut to an angle of 45°, as in Fig. 1.



Smooth one side and one edge of each piece for working faces, and gauge the ends with two lines, one ⅜ in. from the face; the other ⅞ in., for the sides of the tenons and mortises. Shoulder lines, 9½ in. apart, are scored with a knife square across the faces of the tenoned pieces, while pencil lines across the others limit the depth of the mortises. Rip the ends with the saw, splitting the line and cutting in the waste wood. Crosscut the shoulders, and chisel the mortise bottoms from both edges. Try for fit, apply glue liberally to all joining surfaces, and clamp up. Small clamps across the thickness of the joints will prevent wedging open. Set aside to dry until the turned work is done.

Rip 1½-in. strips from 1½-in. stock for larger spindles, and punch the centers of the ends with a nail. The photo below Fig. 1 shows a crude lathe driven by a washing-machine motor. The headstock is a piece of 2 by 4-in. wood, notched at one end to fit over the edge of another length of 2-in. material, to which it is nailed. A 16-in. spike, driven through the center 4 in. above the bed, forms a turning

center. The tailstock is like it, but left loose. The tool rest is a board of suitable width clamped in the vise. The spindle, drilled to fit the centers, and roughly rounded on one end to serve as a pulley, determines the distance between head and tailstocks. These, when clamped to the tool rest, form a rigid assembly.

Bore a piece of hardwood to fit the motor shaft or collar, turning it to a groove diameter of 2½ in. Over this drive pulley, pass a round leather belt, or, lacking this, a piece of carpenters' chalk line woven into a chain stitch and knotted together for a splice.

If a motor is not available, tie a 2-ft. length of inner tube to the ceiling for a return spring, with the belt tied to the lower end. Loop the belt around the spindle, attaching it to a 1 by 4-in. treadle, 3 ft. long and hinged to the floor at one end by two spikes driven through ¼-in. holes. With a little practice, very good turning can be done on this primitive lathe.

The average amateur has no turning tools, so shift must be made with common chisels. Sharpen a gouge to a razor edge. Fix the rest a little above center. Lay the gouge on it, holding it level with the left hand close to the rest and steadying the handle with the right. Point the blade and incline its diameter somewhat in the direction of motion, taking a cut from one end to the other of the stick. A little practice will show how heavy a cut can be made without slipping the belt. Rough the spindle to the largest diameter.

Figures 3 and 5 illustrate the legs. Cut the stock 1½ in. longer than the finished length, to allow for the pulley. Lubricate the centers with hard oil. When roughed to roundness, lay a rule on the rest, marking the divisions with a pencil while the piece turns. Work out the slender parts with the gouge to the finished diameter. If the tool is held well on edge in making the large coves, a shearing cut is obtained. Scrape the cylindrical portions with a ¼-in. chisel, holding it on edge to cut the shoulders and finishing with the blade held flat. For the beads, use the corner of the gouge, tipping the tool on edge as it nears the root depth. Cut the ⅛-in. coves with the tip of a rat-tail file. When the whole leg is shaped, smooth well with sandpaper. Lastly, cut to length.

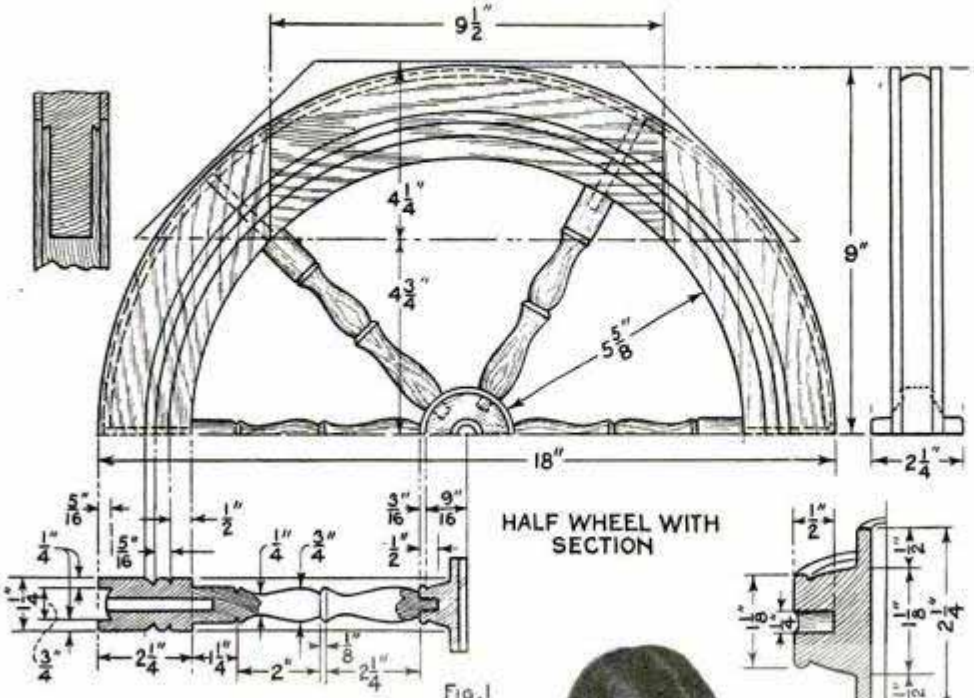
Turn the two wheel supports, Fig. 2, in the same way. Rip the upper end of each through the diameter to a depth of 2⅛ in. Parallel to this, 3/16 in. from it on either side, make two other cuts. Bore the bottom with a ⅜-in. bit, as in another photo. File the slots smooth.

Figure 4 details the spindle crossarm, which fits over the tapered nut above the turned base, carrying the two spindle supports. The smallest coves are lines made with a three-cornered file. Centering 1⅛ in. from the left shoulder, bore a ¼-in. hole, ⅛ in. deep. Bore through the diameter with a ½-in. bit, and with a ¼-in. chisel and round file taper the small hole to meet the large upper one. Another hole, centering 8½ in. from it, is bored and tapered parallel to it. A third hole, tapering from ⅝ in. above to ¾ in. below, centers 2½ in. from the first, inclining at the rate of 3⅜ in. horizontally with a vertical rise of 6 in. Clamp the piece in a vise with the end holes properly inclined, as determined by a straight stick thrust through and compared with a square held upright on the bench. The bit can then be held vertical in the usual manner.

Figure 6 shows a mortise, ¼ by 1 in., in each spindle support, receiving a sole-leather spindle bearing. One leather is pierced with a ⅜-in. hole, while the other, carrying the tapered end of the spindle, is 3/16 in. Glue these in. Turn the tapers to such a diameter that the lower ends, solidly seated, project ¼ in. below the crossarm. Fig. 7 illustrates the distaff support. Four and one-eighth inches from the lower end, a ½-in. hole, 1 in. deep, carries the distaff crossarm, also detailed in Fig. 7. A ½-in. hole, 1 in. deep, centered on the cylindrical part of the crossarm, receives the distaff.

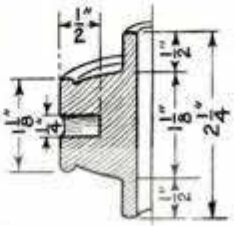
For tightening the belt, a screw, shown in Fig. 8, must be made. If an old wood clamp is available, the screw and nut may be turned from it; but if not, turn the screw from 1½-in. stock, with the threaded part ¾ in. in diameter. The end bearing is ½ in. through. The ¼-in. groove engages a wooden key in the base, to prevent withdrawal when the belt is slackened.

To get the pitch of the thread, build a miter box, ¾ in. wide, 1 in. deep and 4 in. long. With a backsaw, inclining 1/16 in.

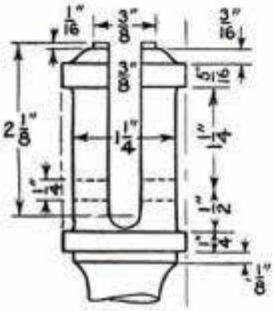


HALF WHEEL WITH SECTION

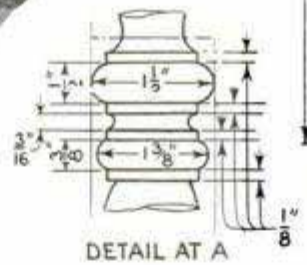
Fig. 1



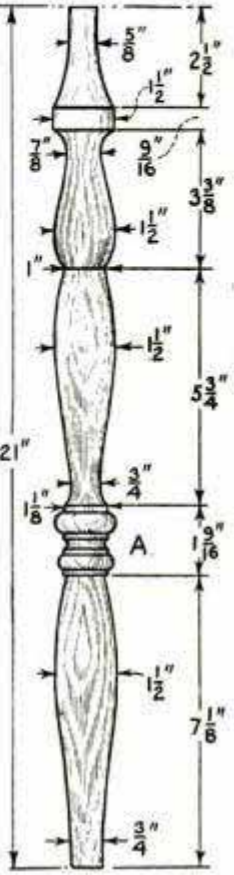
WHEEL HUB



DETAIL AT B

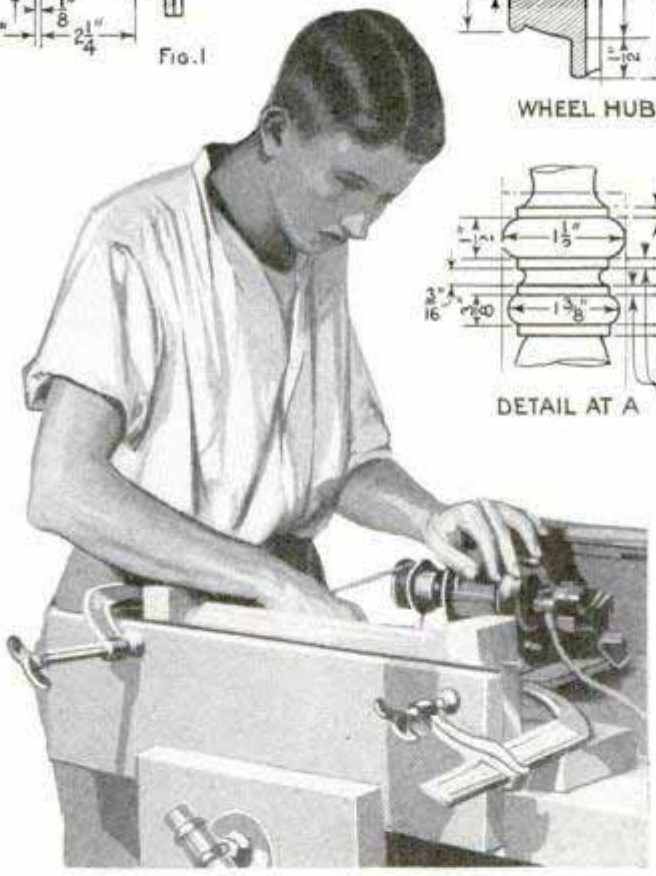


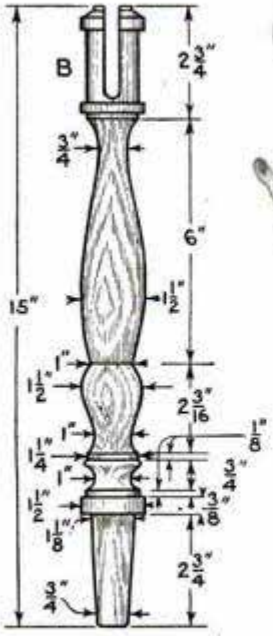
DETAIL AT A



BACK LEG

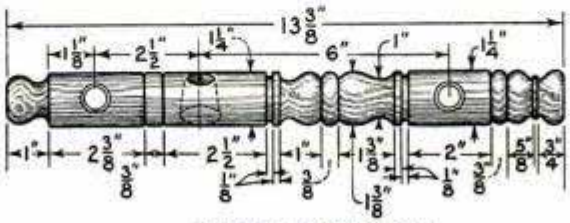
Fig. 3





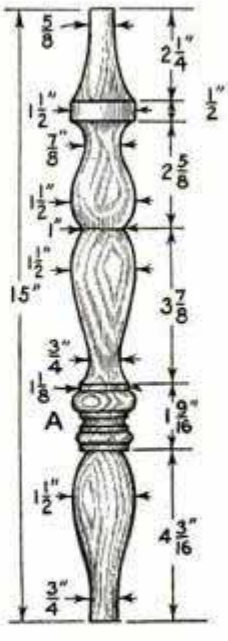
WHEEL SUPPORT
TWO REQUIRED

Fig. 2



SPINDLE CROSSARM

Fig. 4



FRONT LEG
TWO REQUIRED

Fig. 5

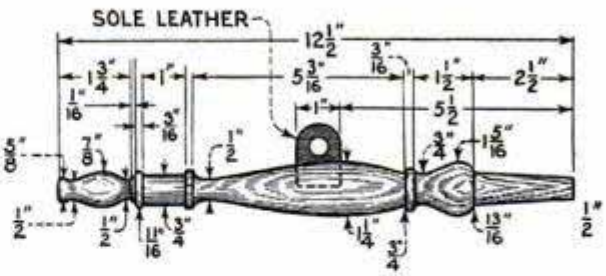


Fig. 6

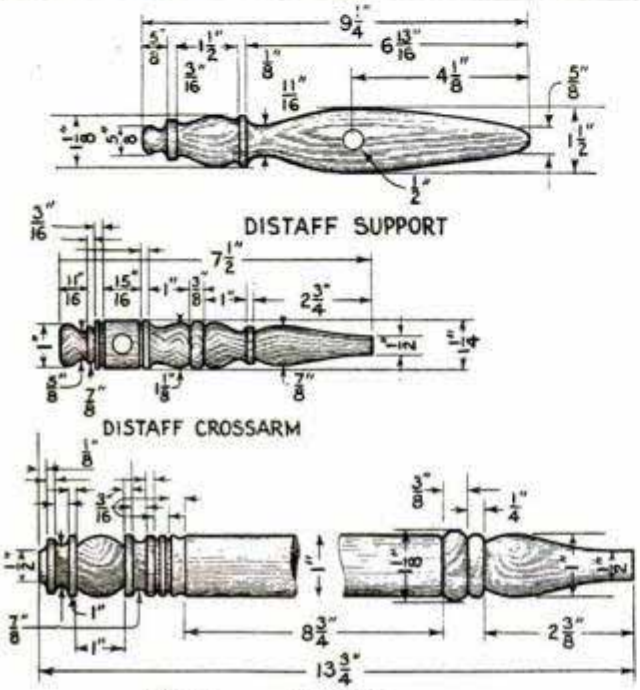
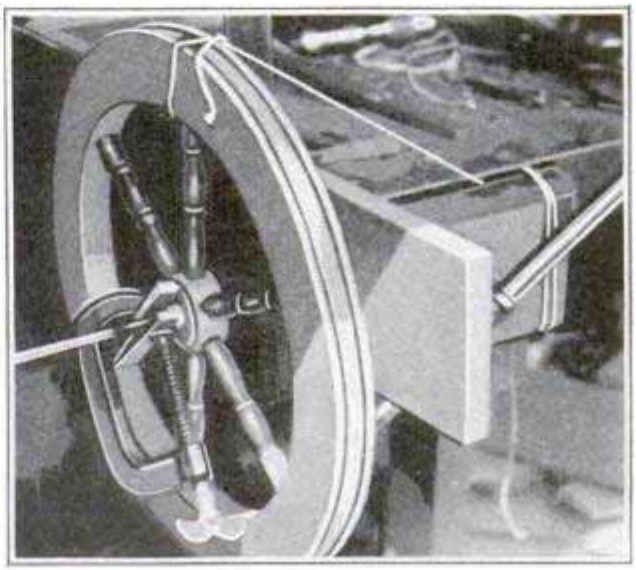


Fig. 7



Upper Left, Spacing Spoke Holes in the Hub; Lower Right, Truing Up the Wheel

from the square in the ¾-in. width, make a cut, ⅜ in. deep, across the middle. Insert the end of the screw blank and cut a groove about 1/16 in. deep, turning slowly and moving the saw in two or three short strokes. Next, draw a pencil line midway between the grooves and whittle the thread roughly to shape. Smooth the groove with a saw file, and trim the threads evenly to final depth with the knife. Finish smoothing with the file. A surprisingly accurate thread can be made in this way.

The nut, Fig. 8, having a square portion, 2⅝ in. long, to slide in the base guide, is turned off on the corners to a diameter of 1¾ in. Bore a through hole 1⅛ in. in diameter, centering 1¼ in. from the taper shoulder. Cast the threaded nut in plastic wood, as indicated in one of the photos. Bore a 1¼-in. hole through a 2 by 4-in. piece, 1 in. from the end, and rip out the end. In the bottom, lay a thick bed of plastic wood. Press the oiled screw into it, mold the top and force the piece sawn out of the block against it. Cut the wooden mold to liberate the bushing, leaving it on the screw until well hardened. Afterward trim the bushing to fit the tapered nut and glue it in place.

The turned spindle base, Fig. 9, is best made from 4 by 4-in. solid stock, but if this is not available, glue two pieces of 2-in. stock together with the grain running at right angles, bore the hole and taper it, and drive it over the nut taper for an arbor. Turn to dimensions. It is recessed in the bottom ½ in. deep. The bobbin, dimensioned in the same drawing, is pierced with a ¼-in. hole, so as to turn freely on the spindle.

The spindle can be made from a 3/16-in. curtain rod, obtainable at most 10 and 15-cent stores. Split the end for ¾ in., bending the halves outward and back parallel, to give an inside width of ⅜ in. Cut the rod to 8¾ in., and file a taper, 1⅝ in. long, on the solid end, reducing it to ⅛ in. Thread the rod for ¼ in. just above the taper where a nut sunk in the flier pulley engages. The eye bearing is a ferrule cut

from the base of an oilcan spout and filled with plastic wood. When dry, fit the eye ends solidly and bore out the center. The flier and pulley are also detailed in Fig. 9.

The flier is sawed from ¾-in. stock. Through a ¾-in. button, ⅜ in. long, and the slightly less than 3/16-in. hole in the flier, the spindle is forced until the eye sinks into the button enough to grip it strongly. Screw nine small iron hooks into each flier arm, and, lastly, screw on the flier pulley. (In use, the flax or wool is fed through the eye bearing and looped over the hooks, with the end tied to the bobbin. The flier, rotating, twists the yarn, while the bobbin, having a smaller pulley and revolving faster, winds it up.)

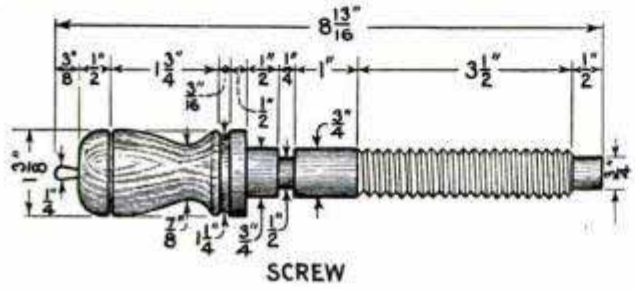


Fig. 8

Two small pins, shown in Fig. 11, are turned to hold the wheel axle in the slots. The axle is a 5½-in. piece of ⅜-in. round iron. For the crank, bend a 5/16-in. bolt to an arc of about 1⅛ in., hammering it to a thickness of 3/16 in. Near one end, drill a 3/16-in. hole, to be filed square. Centering 2 in. from this, drill the crank-pin hole. File a square end on the axle for riveting to the crank. Use a piece of hinge pin for the crank pin, supplying washers, as in Fig. 13.

Scribe the inner and outer diameters of the wheel with a pivoted stick, as in the photo, and cut the outside with a keyhole saw. Smooth with a spokeshave. Nail, across the two faces, pieces of 1 by 4-in. stock with the nails in the waste wood. Locate the wheel center by scribing intersecting arcs from various points on the inner rim line. (See photo.) Bore holes

Upper Right, Paring Molding on Base to Make Bead; Lower Left, Boring Distaff Hole

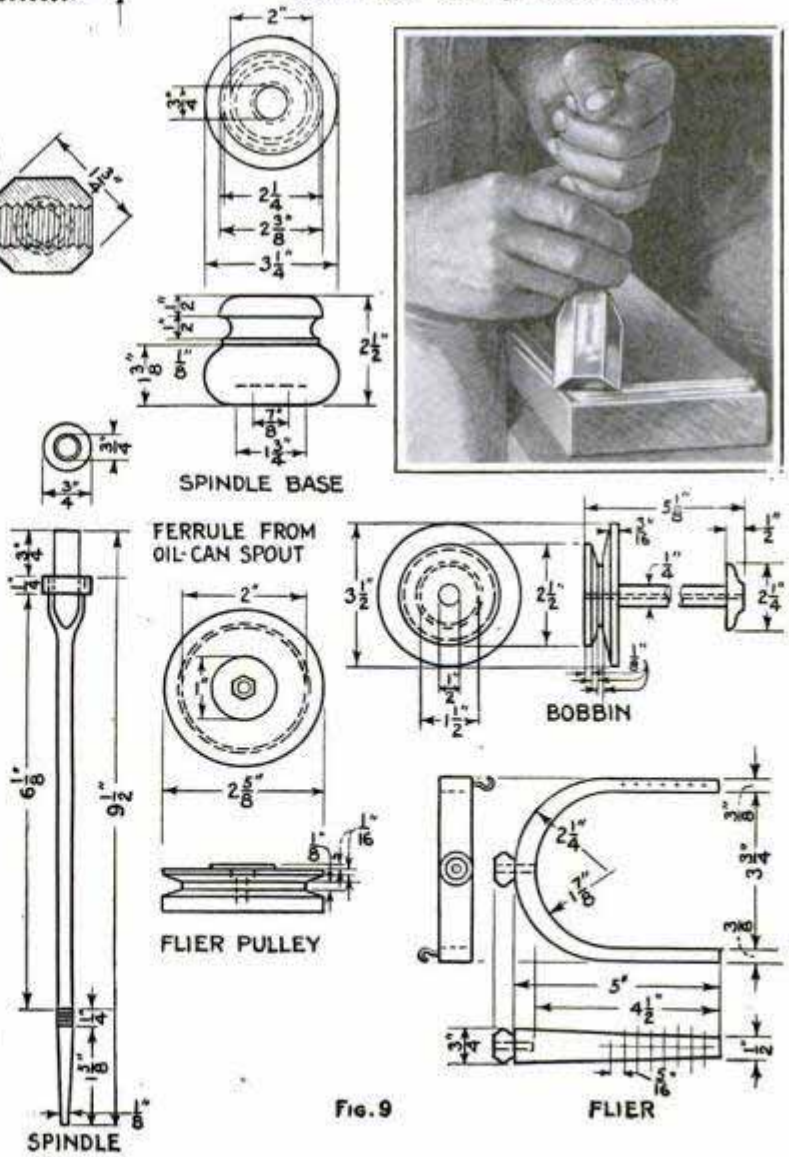


Fig. 9

in these temporary "spokes" to fit a piece of broomstick snugly; the spokes are nailed to the broomstick and a stout wooden crank is attached, after mounting in 2 by 4-in. bearings held in the vise. Stand on the floor a board long enough to serve as a tool rest, bracing it to the bearings. On each side of the wheel, with the least possible clearance, nail a guide piece, preventing side wobble with relation to the tool rest. If another person turns the crank, the belt groove detailed in Fig. 1 can easily be turned.

MATERIAL LIST

1 piece, 1½ by 5 in. by 5 ft., maple.
1 piece, 1½ by 8 in. by 4½ ft., maple.
1 piece, 1 by 6 by 12 in., maple.
1 piece, 4 by 4 by 12 in., maple.
1 piece, 2 by 10 in. by 2 ft., oak.
1 hinge pin from loose-pin butt, 2½ by 2½ in.
1½ doz. small steel hooks.
1 leather shoelace.

Turn the spokes and hub, bore ¼-in. holes, ½ in. deep, in the large ends of the turned spokes, and locate the holes in the hub by stepping around the circumference with a pair of dividers spanning the radius of the hub, as in the photo to the left of Fig. 6. When the inside of the rim is cut and smoothed, bore ¼-in. dowel holes through it at the proper points for the spokes. All being ready, glue up, inserting the spokes in the hub and inside the rim, driving the dowels from the outside.

The photo below Fig. 6 shows a method of holding the wheel true until dry. Insert a ⅜-in. rod into the hub and clamp it level in the vise. Tack a board across the bench end, shimming it square with the rod, and place the wheel. If the spokes are tightly fitted, the hub will bulge outward. Force it into position and hold with sticks clamped to the axle. Rotate it until the part of the rim inclined outward is at the top, where it can be tied with a string, its position being proved by a square held along the shaft.

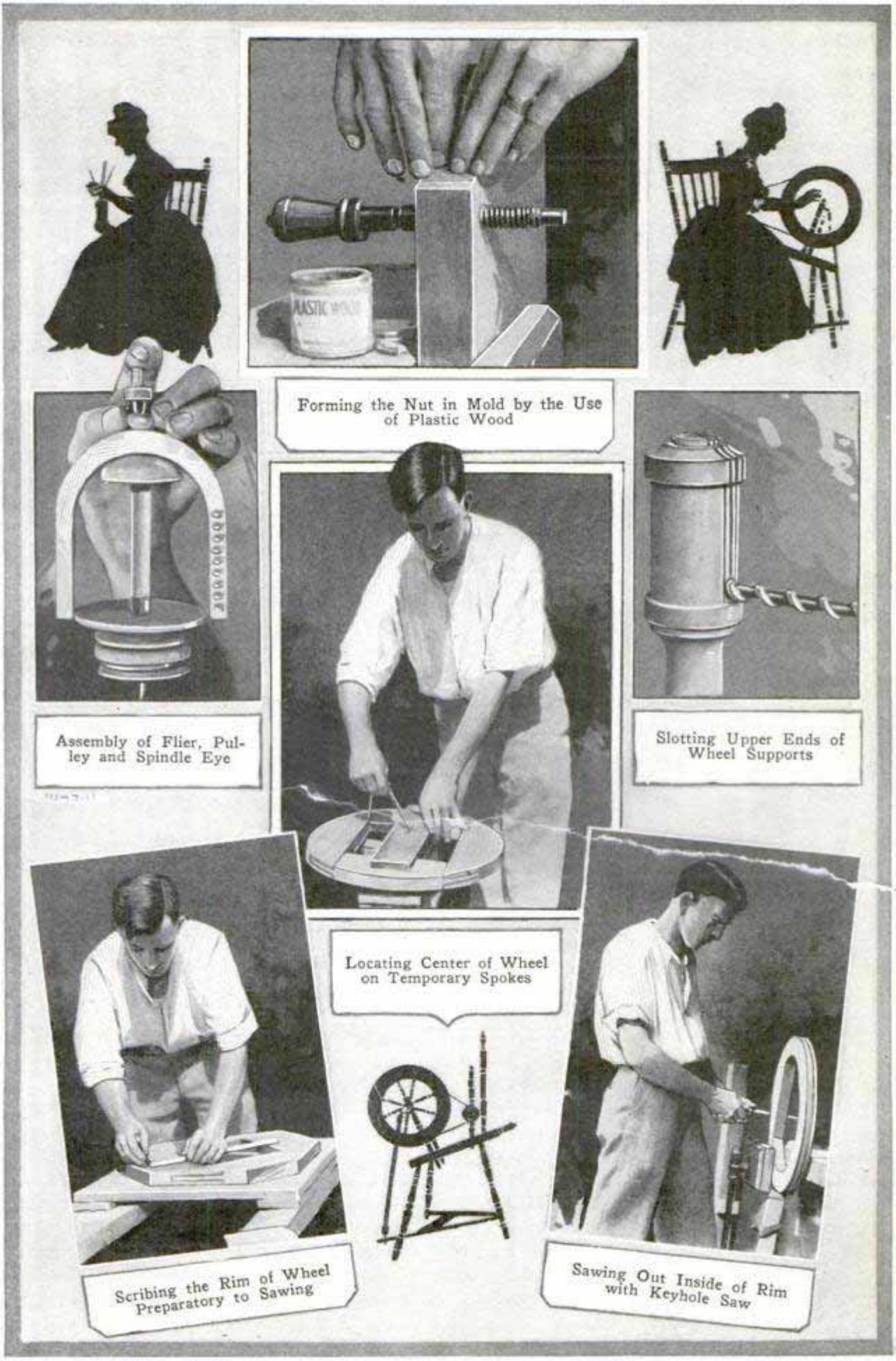
Figure 12 dimensions the oak base. Cut the stock 18 in. long, and work from a center line. To make the molding, rabbet the top edge ⅛ by ⅜ in. Round the corners to a radius of ½ in. Plane off the bead corner and work it round. Bore 1½-in. holes for the ends of the guide, and saw out the material between. The screw bearing is ¾ in. in diameter, 1 in. from the bottom and centered on the nut guide. A ¾-in. hole, ⅝ in. deep, receives the end of the screw. Make a ¼-in. square key hole ½ in. from the end and ¼ in. from the screw center. The nut is slipped into the slot in the base and the screw turned into the nut until the ¾-in. nose on its end is fully seated in the corresponding hole in the bottom of the slot. Then a ¼-in. key is inserted in the key hole above referred to, and driven in until it passes across the ¼-in. groove in the screw, locking the latter in place, and enabling the nut to be traversed back and forth by turning the screw. The spindle base fits on the taper portion of the nut, and the spindle crossarm on the upper part of the nut taper, above the spindle base. Next, the spindle supports are driven into the crossarm, and the spindle fitted into its leather bearings between them. Block the base in the vise at an angle of 3⅜ in. rise in 6 in., and, holding the bit vertical, bore the distaff-support hole, centering 1½ in. from the narrow end and 1 in. from the base center. This hole tapers from ¾ in. at the top to ⅝ in. at the bottom.

The ⅝-in. hole in the bottom for the long leg is 3 in. from the narrow end and 1¾ in. from the center, leaning toward the wide end 1¾ in. in 10 in., and toward the center 1 in. in 20 in. The angles of the front legs can be accurately bored by the use of a guide, as indicated in the photo showing this operation. They incline outward from the center 4½ in. in 12 in., and, parallel to the base center, 4¼ in. in 4½ in.

Assemble the legs with the base, stand on a floor, and scribe the leg ends ¼ in. up for cutting.

Dress the wheel to thickness. Scratch the bead V's with a nail point in a pivoted stick. Clamp the axle in a vise, push the wheel against the bench end, and, holding a ¼-in. chisel against the bench top with the right hand, turn the bead by rotating the wheel with the left hand, pressing the rim against a stop on the bench end to secure a uniform cut. Sand the wheel, assemble the spindles and put the wheel on its axle. Aline the grooves with the spindle and bobbin pulleys so as to mark the axle. Drill a ⅛-in. hole through hub and axle to receive a piece of nail as a key.

Материал, защищенный авторским правом


Forming the Nut in Mold by the Use of Plastic Wood
Assembly of Flier, Pulley and Spindle Eye
Slotting Upper Ends of Wheel Supports
Locating Center of Wheel on Temporary Spokes
Scribing the Rim of Wheel Preparatory to Sawing
Sawing Out Inside of Rim with Keyhole Saw

The pivoted member of the treadle (Fig. 13) is 1 in. square, with the ends turned to a taper. Use pieces of spikes as pivot pins, and hang 2 in. above the floor. The pitman, Fig. 10, has a ¼-in. slot at its upper end to accommodate the crank-pin body. In order that the head of the crank pin, and its washer, may be passed through the slot, the latter terminates, at its lower end, in a ⅝-in. hole. Centering 2 in. from this, at the other end of the slot, is another ⅝-in. hole; this is drilled only ¼ in. deep. From this hole to the first, another slot is cut, ⅝ in. wide and ¼ in. deep, as indicated by the double lines in Fig. 10. This makes a shouldered slot, ¼ in. wide, on one side of the pitman and ⅝ in. wide on the other. The head of the crank pin with its washer rides on the shoulder. Attach the pitman end to the treadle with a leather thong tied underneath.

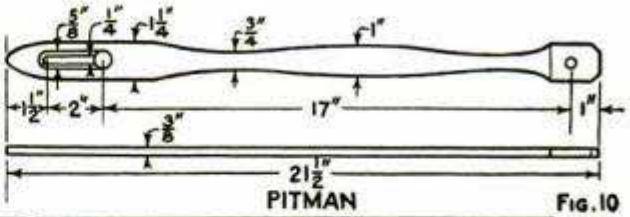


Fig. 10

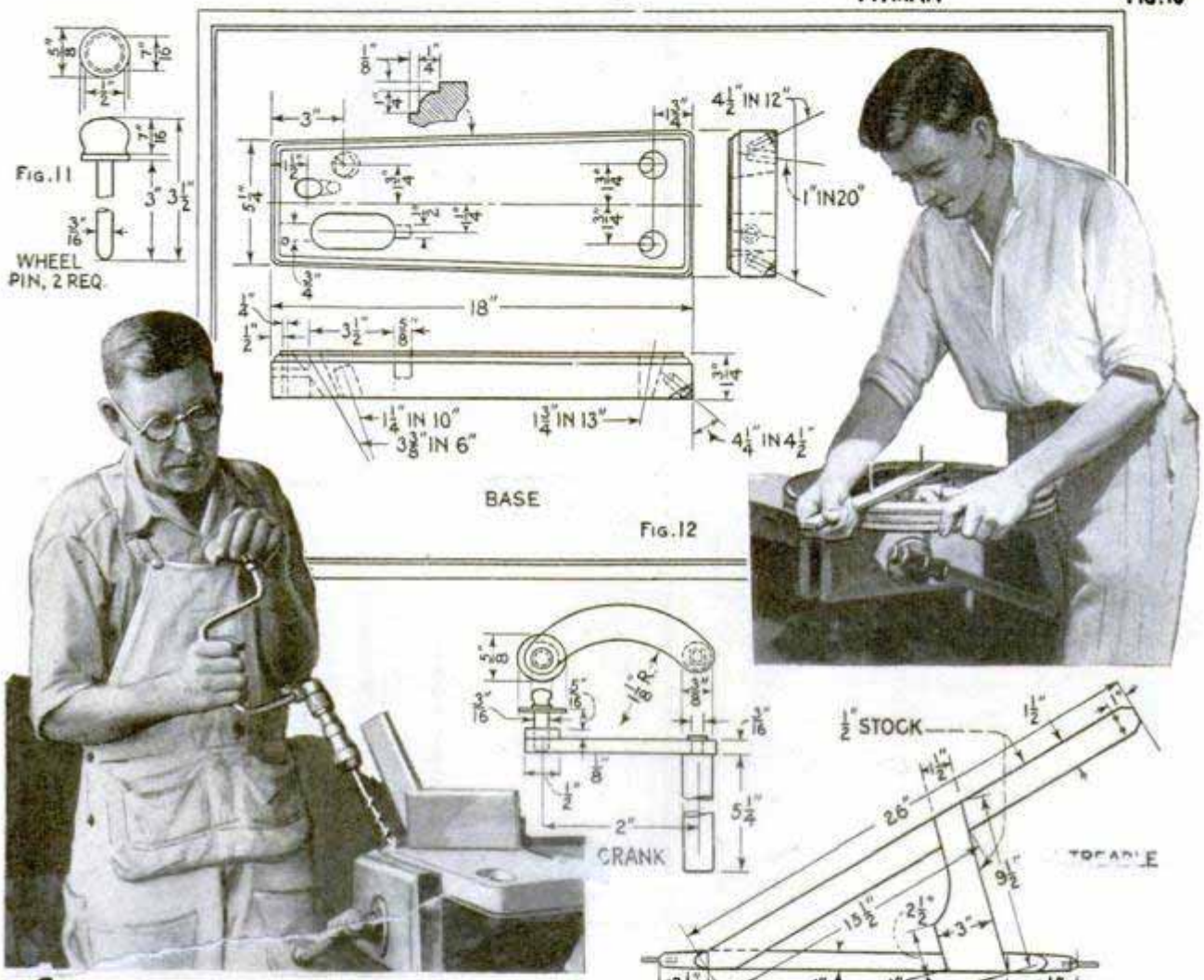


Fig. 11 Fig. 12 Fig. 13

Upper Right, Cutting Beads in Wheel Rim; Lower Left, Boring Holes for Legs

Give the wheel a coat of oil, and when dry and sanded off, give a second coat. Splice a single-string belt around the wheel and both pulleys.

Paper Used as Tire Flap

The tough paper tape used on new casings will protect the inner tube from rust on a clincher rim. The tape is wound around the rim, making several turns, and the tire applied as usual. The loose end of the tape should be held by patching cement so that the wrapping will lie flat while the tire is being applied. Such a tire flap will not stand water as well as one with rubber in it, but costs nothing and is easily obtained when needed.

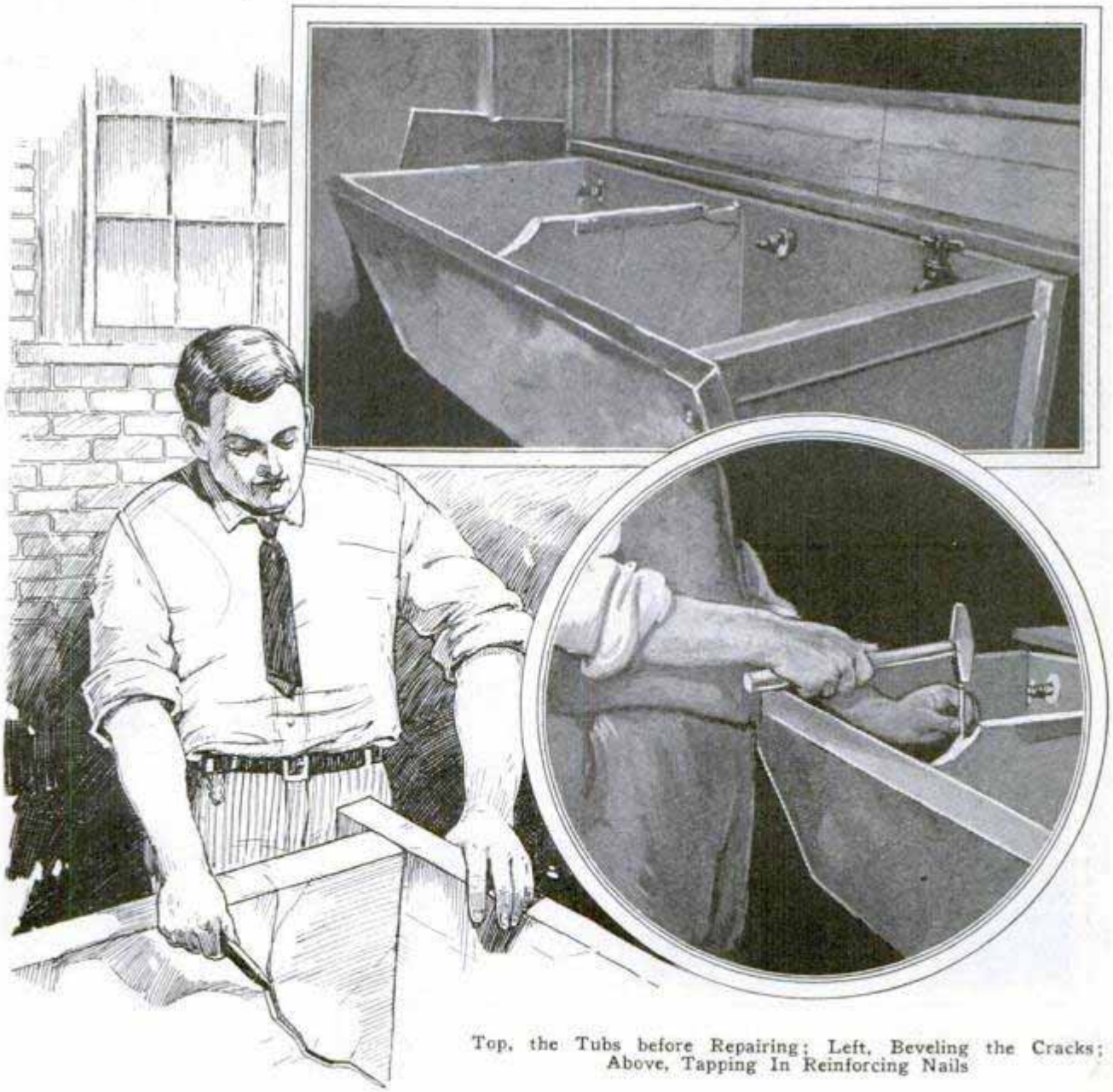
Repairing Broken Laundry Tubs

By R. H. KASPER

WHEN the household laundry tubs, which are usually made of an imitation stone, begin to leak, the housewife may tolerate the inconvenience for some time, but eventually the tubs have to be discarded. The following method was successful in repairing a set of tubs which leaked in practically every joint; in addition to this, many pieces were broken out and some of the panels were cracked. The condition of the tubs may be seen from the first illustration.

One point which it is necessary to observe is that the repair must be made from the inside; for any repair made from the outside will allow the water to seep through the cracks and, in a short time, leakage will again take place. The tubs should first be carefully examined for cracks. These may be very fine lines, scarcely discernible, but nevertheless they let water through, especially if it is hot. As the cracks are found they should be marked with chalk or crayon, as it is otherwise easy to lose track of them.

After the cracks have been found and marked, the first thing to do is to bevel them; that is, to cut a V-groove along the cracks. The "V" may be cut with a cold chisel, or may be scraped with the



Top, the Tubs before Repairing; Left, Beveling the Cracks; Above, Tapping In Reinforcing Nails

corner of an old file. As the material of the tubs is quite hard, the file edges will be rapidly dulled; a new sharp surface may be secured by breaking a piece off the end of the file. Laundry tubs are usually made with the end panels fitting into grooves in the front and back panels. This is a common point of leakage, as the original cement deteriorates and breaks out. These corners should be scraped thoroughly, so as to remove as much of the old, loose cement as possible.

If any of the panels are broken, which they usually are if a wringer or other appliance has been attached to them, the broken sections must be built up with cement. Some method of reinforcing these parts is necessary. With a regular machine drill, make a number of small holes, about 1 in. apart and 1 in. deep, into the broken sections. The drill must be sharpened frequently, to keep it cutting clean. A wire nail is then driven into each hole so that the head will come slightly below the finished surface. Care must be used in selecting the drill size, as the nail should be a light tapping fit in the hole; if driven too tightly, it may crack the composition.

After the nails have been placed, a mold is built around the broken sections. This is done by clamping a piece of wood on each side of the panel, fitting it well into the corners and flush with the finished surfaces. A mortar is then prepared by mixing two parts of fine white sand with one part of Portland cement, adding enough water to make a paste which pours easily. After wetting the broken surfaces with water, pour the mortar into the mold, working it well down into the cor-

Lower Left, Mold in Place; Right, Drilling Holes for Reinforcing Nails; Above, Finishing Repaired Sections

ners with a thin stick. Any excess is scraped off flush with the top of the mold. For filling the beveled cracks, the mortar should be of a heavier consistency, and should be worked in very carefully and smoothed with a trowel

Twenty-four hours later, the mold may be removed and any irregularities filled in or smoothed off. The cement is then permitted to set until it becomes hard to the touch. Finally, a wash is made with Portland cement and water, the mixture being about like heavy cream. This is applied to the repaired parts and to the corners with a varnish brush. Drying will take place rapidly, usually within an hour, after which a second and third coat should be applied, also with a brush.

After the repaired parts have become stone-hard, scrub the inside of the tubs with a stiff bristle brush and clear, cold water. A soap mixture is then made, cutting a cake of yellow laundry soap into small pieces and dissolving it in ½ gal. of water; warm water will dissolve the soap more rapidly, but the mixture must be applied cold. A varnish brush is used, and the solution rubbed in well so as to fill all the pores. After drying overnight, a mixture of alum, 1 lb., and water, ½ gal., is applied with a brush. It must be brushed in well, as the soapy surface repels the alum water in much the same manner as an oily surface repels water. After drying, the tubs should be filled with clear, cold water and permitted to stand for a few days to thoroughly harden the cement, after which the tubs will be ready for use.

A set of laundry tubs repaired by this method held water for two weeks without any noticeable drop in the level, whereas, before the repair, they would leak empty in a few hours.

¶An ever-ready auto creeper can be made by putting casters on one of the car's floorboards.

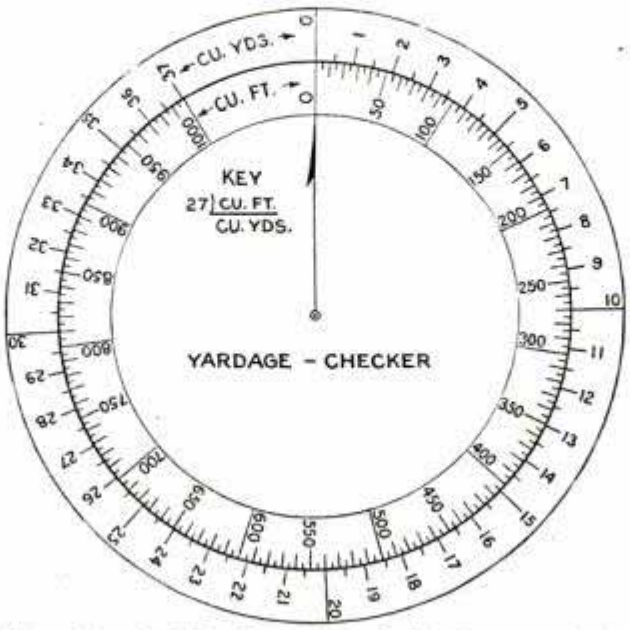


Chart for Quickly Converting Cubic Feet to Cubic Yards and Vice Versa

When the Grease-Cup Cap Is Lost

Small grease-cup caps disappear and become lost with an aggravating frequency. You can still keep the cup lubricating very satisfactorily, however, if a light grease is used at the time. Take an old tire-cement tube or similar collapsible tube, and cut it in two. One of the halves is cleaned out, filled with grease and tied securely to the post portion of the cup. Squeezing the tube from time to time forces plenty of the light grease down into the bearing.—Frank W. Bentley, Jr., Missouri Valley, Iowa.

Simple Yardage Checker Aids Engineers

A yardage checker of the kind shown in the drawing should be of interest and value to engineers and contractors for making preliminary estimates, and for a close check on final estimates. Its use is simple, reasonably accurate and avoids the possibility of error in division. The number of cubic feet is read on the inner circle and cubic yards directly opposite on the outer circle. For quantities from 1,000 to 10,000 cu. ft. the decimal point of both cubic feet and cubic yards is moved one place to the right; from 10,000 to 100,000 cu. ft., two places to the right, and so on. For example, 200 cu. ft. equals 7.4 cu. yd., 2,000 cu. ft. equals 74.0 cu. yd., 20,000 cu. ft., 740 cu. yd., and so on, for larger quantities.

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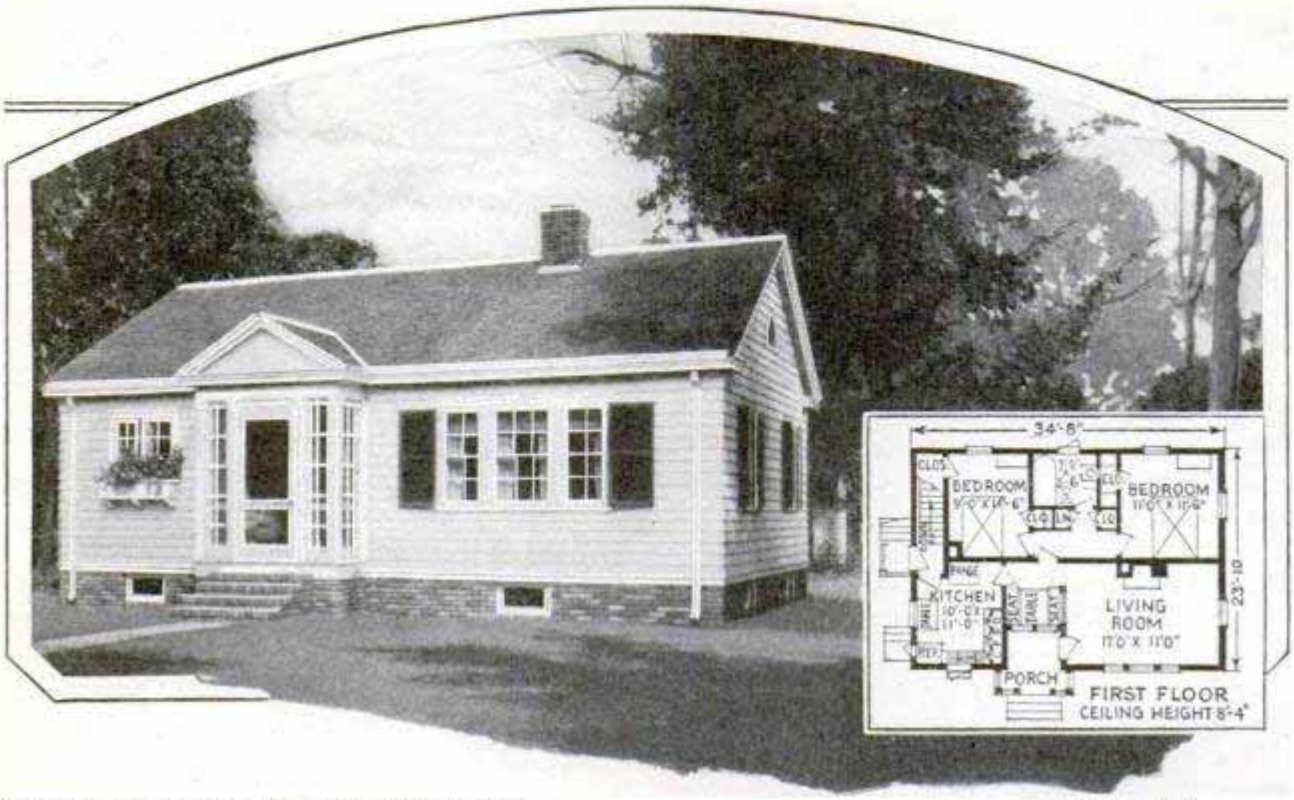
Is This Your Home?



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Plan No. 4A10

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THIS delightful colonial bungalow is fully worth the appreciation critical home builders will feel for it. It is as convenient and economical a plan as you can find anywhere. Every comfort-giving feature is provided. Inside and out, the design has been kept simple and inexpensive, without missing any of the essentials of a modern home or sacrificing exterior charm. It is built entirely of frame with wide bevel siding on the exterior; shingle roof; brick base course and brick chimney. While the plan calls for a full basement, this can be omitted if desired. This house can be accommodated on a forty-five-foot lot. The plan is based on a rectangle; the roof is simple; there are no expensive extras—so this should be a home reasonable to build.

Its features in the way of conveniences are many. In this plan, for instance, the living quarters have been designed to occupy one side of the house and the sleeping quarters the other. Entrance to the bedroom section leads off a private hall.

The latticed entrance porch is a little to one side and opens directly into the living room. The porch is so well protected that a vestibule is unnecessary. The living room is beautifully proportioned. The brick fireplace with its handsome wood trim is in the center of the long inside wall.

In reality, this is a five-room house, because the dining alcove, equipped with the popular built-in side seats and table, has all the advantages of a dining room, yet it does not consume the valuable floor space that a dining room would take up in a house of this size. The beautiful, open grill which separates living room and dining alcove is really a decorative feature that adds distinction to both rooms.

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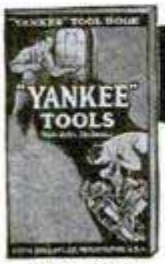

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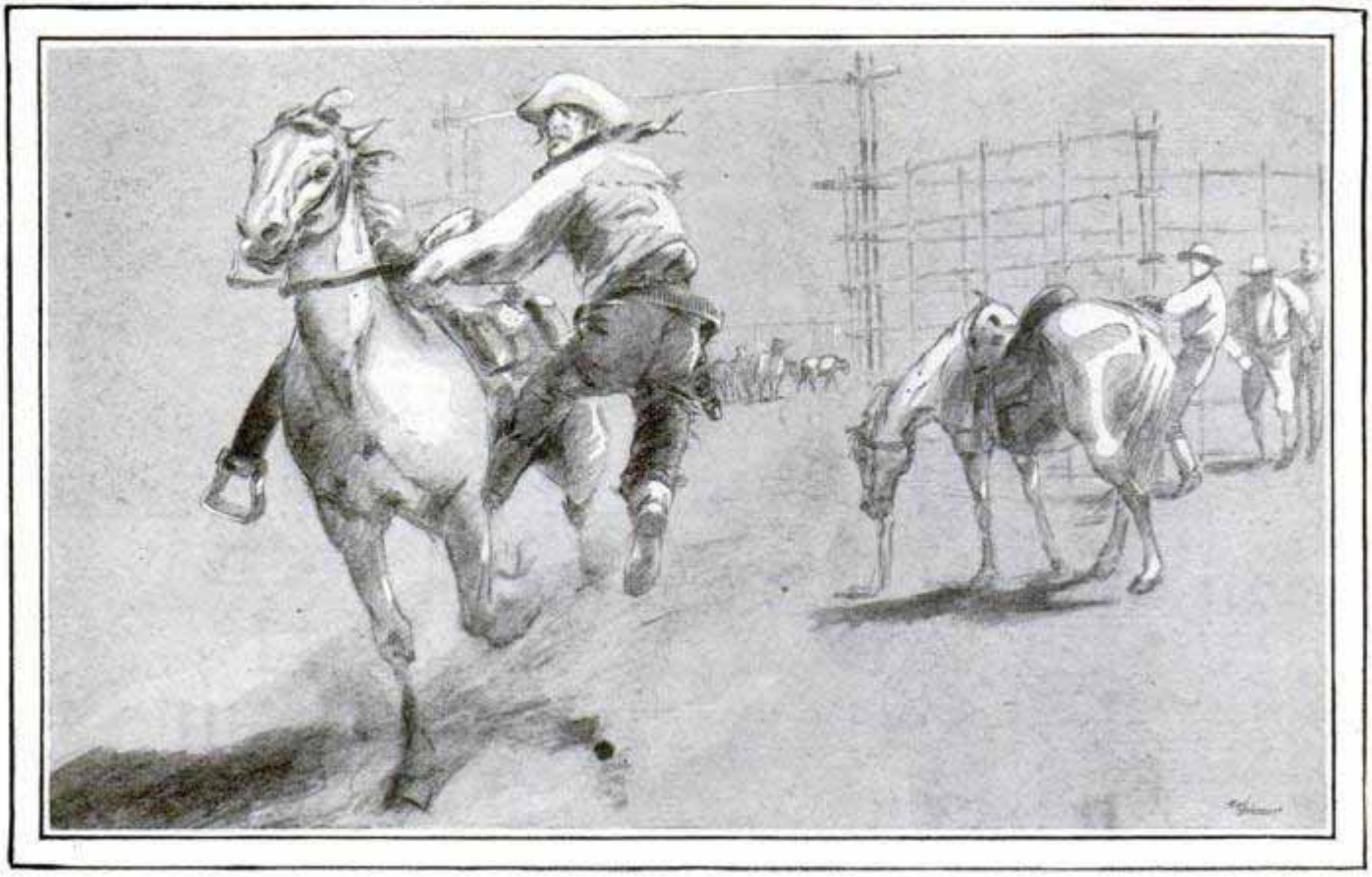
Write for this interesting little book. It tells just what you want to know about all the famous "Yankee" Tools for making work easier and quicker.

No. 41 (Illustrated). No. 44 has spring with Adjustable Tension for regulating pressure according to nature of wood, size of drills, etc.

Look for "YANKEE" on the tool —your protection against imitations

"YANKEE" TOOLS

Make Better Mechanics



"Get the message through"

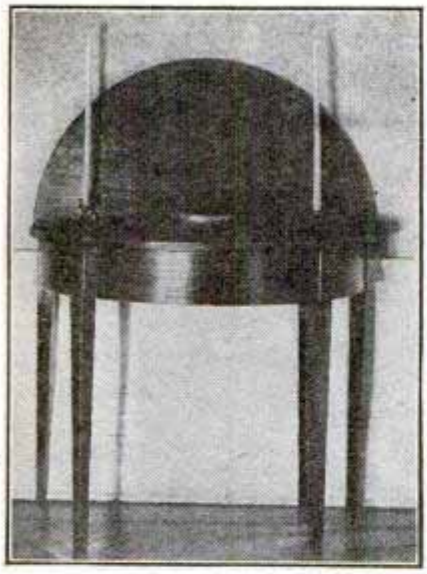
An Advertisement of the
American Telephone and Telegraph Company

In the Sixties the "pony express" carried the mail over mountain and Indian wildernesses from St. Joseph, Missouri, to San Francisco. The express riders and station keepers won undying fame for getting the message through, regardless of hardship or danger.

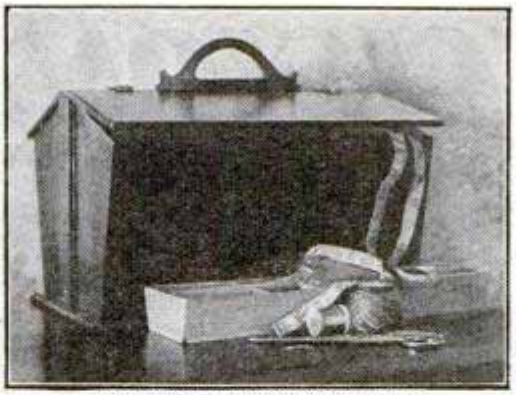
Today, in the city of Denver, there is rising on the site of one of the old pony express corrals another splendid structure dedicated to the service of modern message-bearing—the new headquarters building of one of the companies of the Bell System. In fact and in spirit, the Bell System is the lineal descendant of the pony express.

It is this spirit of responsibility that causes operators to risk their lives by remaining at their switchboards in the face of fire, flood or other great danger. The same spirit calls linemen or repairmen to go out, even at the risk of their lives, to repair the lines in time of accident or storm.

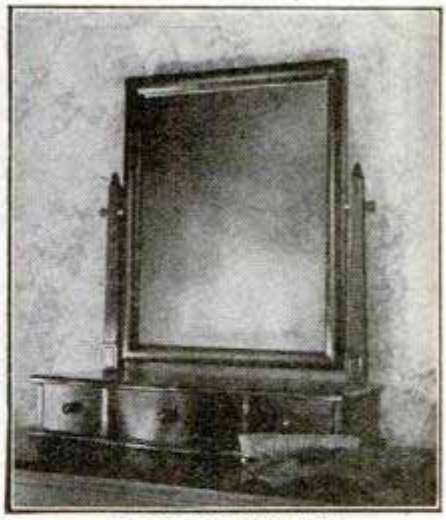
There are no instructions requiring Bell System employees to endanger their lives. It is the spirit of communication that bids them, "Get the message through."



CARD or CONSOLE TABLE
See LePage's Book, page 17



PRISCILLA SEWING BOX
See LePage's Book, page 11



DRESSING GLASS
See LePage's Book, page 21

Now

You Can Make Them Yourself

20 Attractive Pieces of Furniture

LePage's New Home Work Shop Book will show you how

PIANO BENCH
See LePage's Book, page 9

NOW in the long winter evenings, let this New LePage's Home Work Shop Book show you how to make 20 different pieces of gift furniture, designed by an expert — attractive, artistic, useful, practical and easy to make.

New Book—greatly improved

The first LePage's Home Work Shop Book, published a year ago, proved so popular that, though advertised only a few times, over 30,000 copies were sold—an enormous edition for a book of this kind. Now the new book, of which 30,000 additional copies have already been sold, represents a wonderful improvement over the old one. Of its 20 complete projects, 16 are entirely new and never offered before.

Each project is presented in three parts—a photographic illustration of the finished project, a complete dimension drawing of its parts, and simple, easy-to-follow directions, for making, given step by step from start to finish.

Designed by Expert

For each of the 20 gift projects, the design, dimension drawings and photographs, as well as the actual articles, were made by William W. Klenke, Instructor in Woodworking, Central Commercial and Manual Training High School, Newark, New Jersey.

Assurance is therefore given that each project and the directions for making it is perfectly practical.

In addition to the four pieces illustrated above, the book includes the following 16 projects: Occasional Table, Spanish Ship Model, Folding Sewing Screen, Fernery Stand, Tilt Top Table, Piano Bench, Costumer, Priscilla Sewing Box, Table Desk, Desk Chair, Card or Console Table, Turned Bench, End Table with Book Trough, Foot Stool, Book Stand and Back Rest. Where else could you get complete directions for making all these things for only 10 cents?

In addition, this new LePage's book contains full information on how to secure plans for making fifteen more new projects, prepared by Frank I. Solar, Teacher of Manual Training in Detroit Public Schools, and widely-known tool craft writer.

Send 10 cents for this NEW *LePage's Home Work Shop Book*

JUST write your name and address on the coupon below, tear it out and mail to us today with 10 cents in coin or stamps, and we will at once send you a copy of LePage's New Home Work Shop Book, postage paid. Address LePage's Chart League, 555 Essex Ave., Gloucester, Mass. Tear out coupon now so you won't forget it.

LE PAGE'S GLUE

HANDIEST TOOL IN YOUR WORKSHOP

Mail this coupon

LEPAGE'S CRAFT LEAGUE,
555 Essex Ave., Gloucester, Mass.

Gentlemen: Enclosed please find 10 cents (coin or stamps) in payment for LePage's New Home Work Shop Book. Please send a copy of this book to

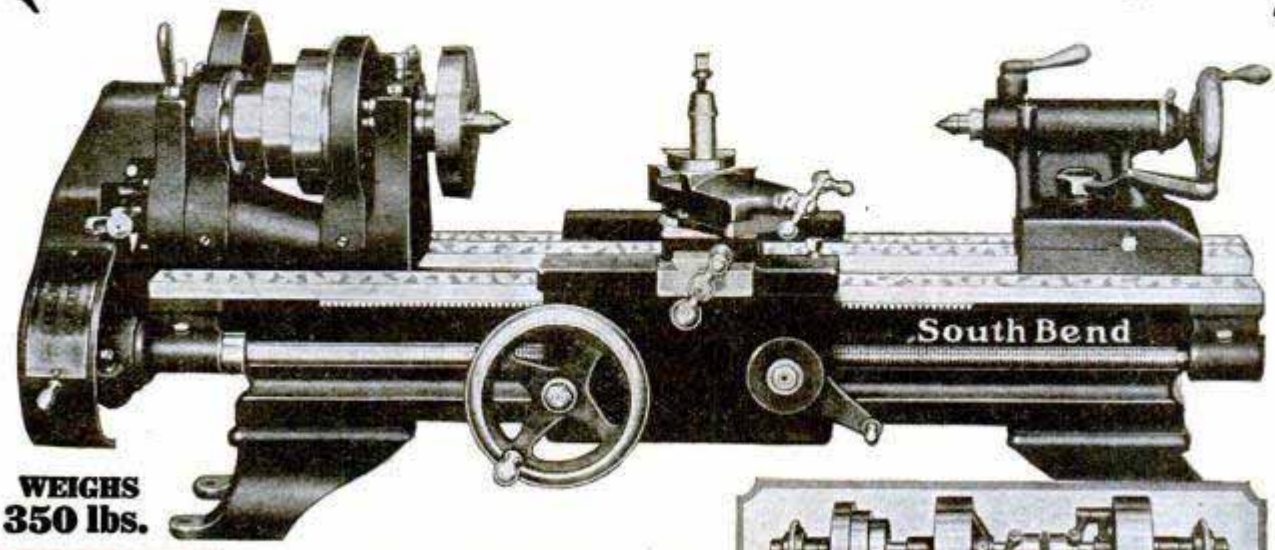
Name.....

Street.....

City..... *State*.....

A PRECISION TOOL

For the Machine Shop, Manufacturing Plant Service Station and Electrical Shop



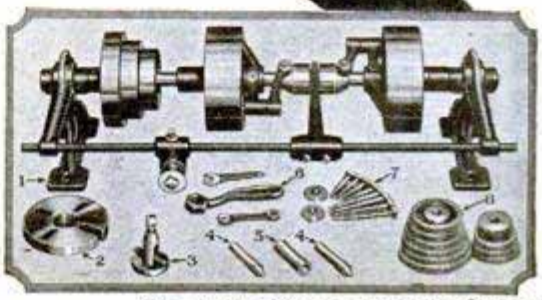
WEIGHS 350 lbs.

9"x2½' New Model Back Geared Screw Cutting Precision LATHE

$150 — *Complete with Countershaft and Equipment*

Easy Payments if Desired

Built in the same plant where 38,000 other fine Precision Lathes have been manufactured for the United States Government, Ford, Westinghouse, Bethlehem Steel Co., U.S. Steel Corporation, and hundreds of other large industries in the United States and 64 Foreign Countries. It is the world's largest Lathe value.



Larger Sizes of this 9-inch Bench Lathe

Complete with Countershaft and Equipment.

Size of Lathe	Between Centers	Weight	Price
9" x 3'	18-in.	375 lbs.	$155.00
9" x 3½'	23-in.	400 lbs.	160.00
9" x 4'	29-in.	425 lbs.	165.00
9" x 4½'	36-in.	450 lbs.	170.00

Also made with 3 types of motor drive.

Features and Specifications

Power Feed to Carriage
Set-over for Taper Turning
Hole through spindle ¾"
Precision Lead Screw
Cuts Threads 4 to 40 per inch
Maximum draw-in Collet size ⅝"

A number of attachments can be fitted to the Lathe for Milling, Grinding and various other classes of work.

Small Down Payment

Balance in Ten Equal Monthly Payments

A small down payment brings you the Lathe to use while you are paying for it. In this way it earns its own cost by the work it does and the savings it makes.

The complete line of South Bend Lathes ranges from 9 to 24-inch swing, and from 2½ to 16-foot bed. Write for name and address of your nearest dealer.

Ask for Free Booklet No. 22-K and Catalog No. 88
on New Model 9 in. Junior, also our complete Lathe Catalog No. 88.

South Bend Lathe Works 634 E. Madison Street, South Bend, Ind., U. S. A.
New York City Salesroom: 183 Centre St.

9" x 2½' New Model Junior South Bend Lathe with floor legs, countershaft and equipment. Price **$160.**

Other Popular Selling Sizes *Complete with Countershaft and Regular Equipment*

Size of Lathe	Shipping Weight	Standard Change Gear	Quick Change Gear
9" x 3'	490 lbs.	$235.00	$270.00
11" x 4'	725 lbs.	300.00	335.00
13" x 5'	1110 lbs.	352.00	402.00
15" x 6'	1550 lbs.	430.00	490.00
16" x 8'	2035 lbs.	510.00	570.00
18" x 10'	2840 lbs.	685.00	750.00

SOUTH BEND LATHES

Laugh at Cold Weather

Get out your car. Use it in any kind of weather, cool or cold, blizzard or sunshine, makes no difference, for a

Marvelous Invention Starts Your Car in 2 Seconds in Any Weather

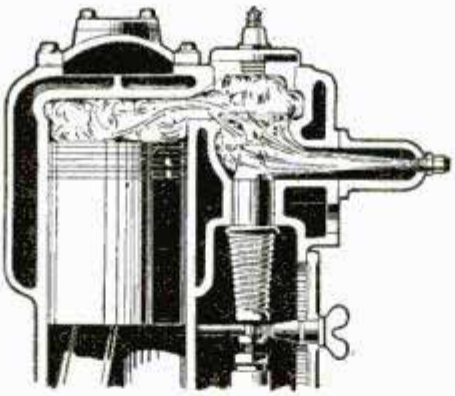
Yes, this is true. Not a bit of exaggeration. No matter how cold it is, no matter how frosty the motor, you can start your car instantly with this new device, the Impelerator. Works from the Dash. Once installed always ready, no extra attachments, no fussing. Always makes starting easy.

Saves Batteries Saves Gasoline

The Impelerator is an amazing invention designed to put POWER into your motor when needed most. No flooded cylinders. No trouble to start in ANY KIND OF WEATHER if you have an Impelerator attached to your Dash. You will find this amazing device will save many times its cost in taking the strain off the battery, in saving gasoline, to say nothing of eliminating trouble and annoyance.

Amazing Results

Truly startling results have been had whenever the Impelerator has been used. Its simplicity, its effectiveness, make it a pleasure to drive any car in the winter. Four cylinders, six cylinders, eight cylinders. All are alike when equipped with the Impelerator. This marvelous device makes cars start easily in any kind of weather. It puts the vital vapor that spells Power into the heart of your engine and makes it start like a race horse.



Puts Power Here

Drive All Winter

You can get real fun out of winter driving for you can let your car stand anywhere without worry. When you are ready to go, no matter what the temperature, use your Impelerator to start your engine instantly. The cost is practically nothing. It fits any car and you can install it yourself in a few minutes, or any garage will install it for you. No extra attachments of any kind, just the complete Impelerator which we send to you, designed to make cold motors start instantly.

Sent on Trial

Thousands of cars equipped with the Impelerator are proof positive that no claim is exaggerated, that the Impelerator will do all and more than we claim for it. As Further Proof, we agree to give you your money back if you install the Impelerator and are not more than satisfied with the result. Try it one day, five days, ten days if you like and if you don't find that it's a real pleasure to start on a cold morning, if you don't find that it always works and that it eliminates all starting trouble due to a cold engine, send it back and we will refund to you every penny that you have sent us. Could anything be more fair, could anything be more positive proof of the tremendous value of this automobile device?

Over 200,000 Sold The Impelerator is a wonderful adaptation of a scientific principle which enables you to start your car instantly in any kind of weather. Over 200,000 have been sold and no owner would sell it at any price if he could not secure another. Letters galore testify to the wonderful value of this amazing device, the cost of which is so little as to be insignificant.

Agents Wanted

Men who like to sell things, men who want to make more money, to be independent of the daily grind of a mere job, men who understand how easy it is to sell a really good thing, write quick for full particulars of the offer which should enable any one to make . . . . . **Big Money**

Don't wait a day. Don't give someone else the chance to get in ahead of you. Grab good territory while it is open. Write or wire now. We believe there are tremendous possibilities in selling this moderate priced device, the Impelerator, which solves most motorists' winter troubles. Write or wire today.

IMPELERATOR CORPORATION

Dept. 928 25 E. Jackson Blvd. CHICAGO

Impelerator Corporation, Dept. 928
25 E. Jackson Blvd.,
Chicago, Ill.

You may send me Free information about your trial offer on the Impelerator and tell me how I can have one on my car.

If Interested in Agency Proposition—Check Here ☐

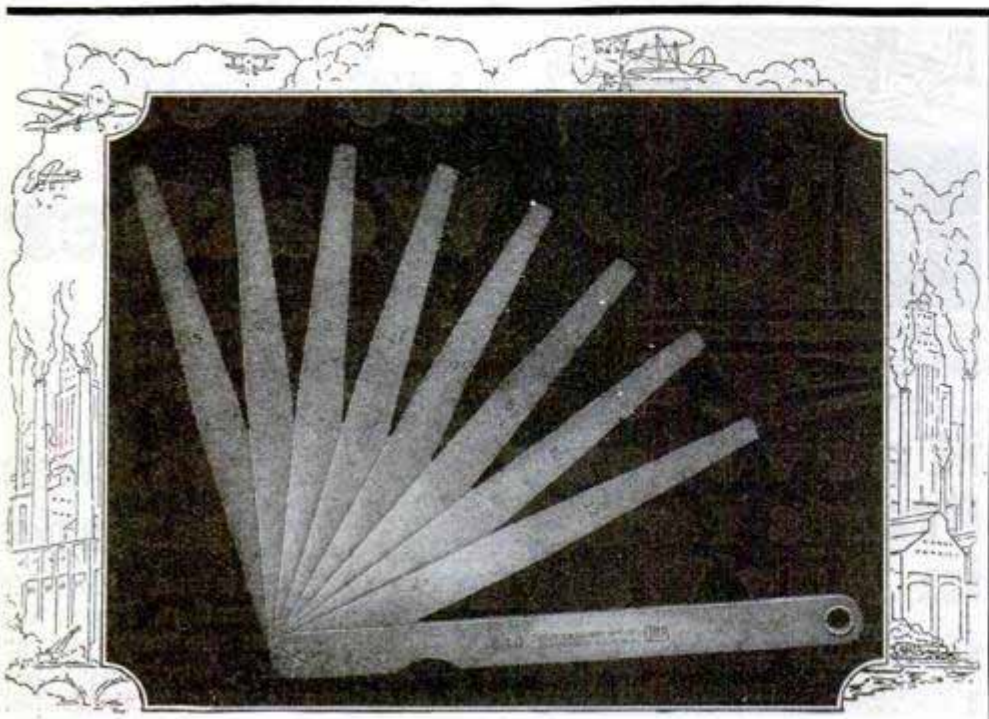
NAME .....

STREET No. .....

CITY .....

STATE .....

ESSENTIAL TO PRECISE WORKMANSHIP



Thickness gauge No. 649, shown above, has extra long blades which increase its usefulness in a number of measuring operations. It is especially valuable in finding the clearance between piston and cylinder walls. The blades are tempered and accurately ground to size

Unfaltering Performance Depends On Good Tools

While accuracy is essential in most fine manufacturing, there are some industries in which it is vital—if an airplane motor falters in the clouds, for example, life may be forfeited.

Manufacturers of airplane engines almost universally use Brown & Sharpe Precision Tools to make the accurate measurements upon which unfaltering performance depends.

And men everywhere who appreciate good workmanship will want a few Brown & Sharpe tools in their home workshop. Catalog No. 30 lists over 5,000 items. Copy at your hardware dealer's or sent you free on request. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A. Dept. P. M.

BROWN & SHARPE TOOLS

* COMBINATION SET
Catalog No. 438

* MICROMETER CALIPER
Catalog No. 8

* UNIVERSAL SURFACE GAUGE
Catalog No. 620

* SCREW PITCH GAUGE
Catalog No. 630

* VERNIER CALIPER
Catalog No. 750

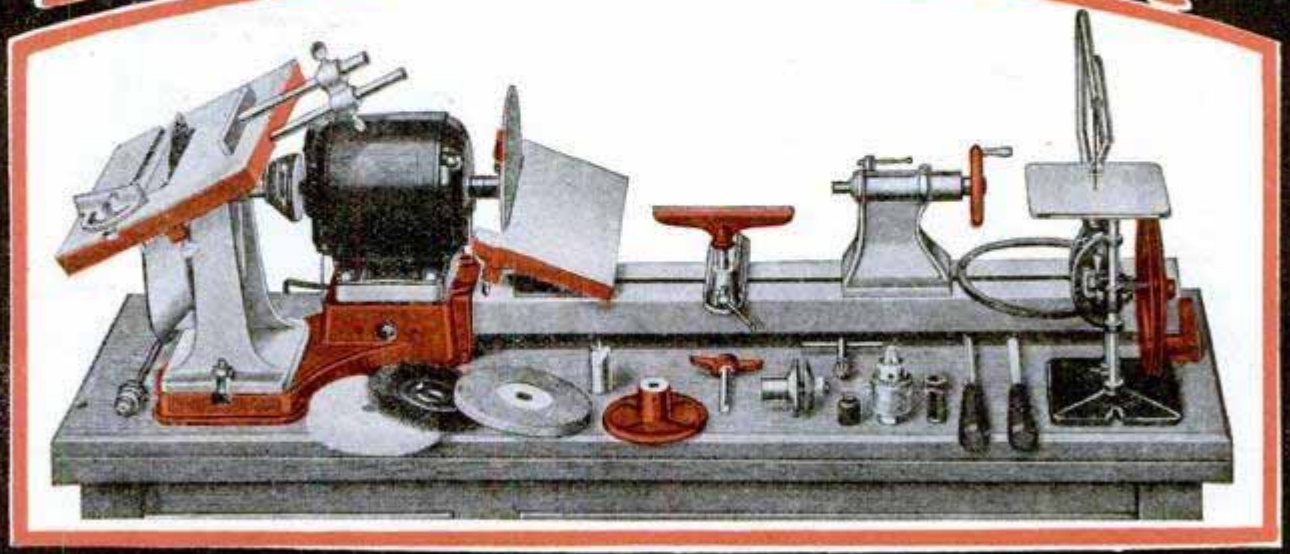
* TOOLMAKERS' BUTTONS
Catalog No. 758

* MICROMETER CALIPER
Catalog No. 55

* *This tool shown in Catalog No. 30*

"WORLD'S STANDARD OF ACCURACY"

Delta Handi-Shop



Here's What You Get

in the COMPLETE Delta Handi-Shop

For Home or Commercial Use

There are many superior points of design incorporated in the DELTA HANDI-SHOP. Features that are very valuable and necessary to produce work on a really practical and efficient basis. For instance—there are always TWO TOOLS ready for work and driven by the powerful, quiet-running TWO SHAFT motor. This enables you to cut your work on Circular Saw, and then immediately sand it on the sanding attachment. Or, you may have a turning job set up in the lathe and want to sharpen a tool. Do you have to break up the operation? Certainly not—simply attach a small emery wheel to circular saw arbor. ¾" capacity Jacobs chuck fits on motor, tail stock or saw arbor without overhang. Note the novel arrangement of the circular saw which is practically used 80% of the time. There is no interference as length of work to be cut is limited only by ceiling, floor and walls. This saw is entirely different from any other on the market and is a distinct DELTA achievement. Table tilts 45° without first removing dado insert. Miter gauge and novel rip gauge, also four extension bars and support bar (not shown) enable you to do a wide range of difficult work. You may use 5" diameter dado heads for grooving. Automatic oiling system is good for 100 hours continuous running. You can easily see the immense size of this shop by noting that the unit is mounted on a baseboard 14"x 48" or 14"x 60", all ready to operate. Net weights 120 lbs., or 135 lbs. There are many more superior features but lack of space does not permit full description. Briefly, the DELTA HANDI-SHOP consists of the following:

LATHE—Two sizes—9" x 24" and 9" x 36" between centers. Heavy lathe bed (4" U-section) will positively not chatter or spring. Ball bearing tail stock, wide and narrow tool rests and base, 4" face plate, spur center, cup center, thrust bearing, adapter flange, emery wheel, buffing wheel and wire brush, all 6" diameter, all oversize. ½" capacity Jacobs chuck with gear wrench, two turning tools and wrenches.

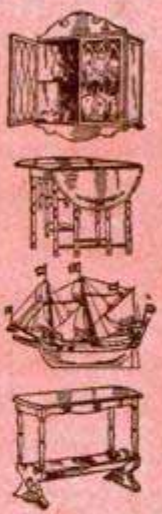
SANDER—8½" diameter aluminum disc takes standard sheet of sand paper. Table of original DELTA design, 5" x 12", tilts 45° down and 15° up.

SCROLL SAW—The new "AMERICAN GIANT" heavy duty saw for production. Distance from blade to rear of frame 12". Cuts 1½" thick wood easily and quickly. Also metal, fibre, Bakelite, bone, celluloid, etc. Large table tilts 45° to left, 15° to right. Same patented design as our smaller model. Saw blade always guided by hardened steel support under table.

MOTOR—Special design two-shaft construction (a very important feature). ¾ H.P. with 100% overload capacity. Quiet running, fully enclosed to keep out dust; with cord, plug and ground wire and clamp.

CIRCULAR SAW—6" blade, rips and cross cuts, runs about 4000 R.P.M. Does not slow down under load. Table tilts, also raises or lowers without first removing dado insert. 5" dado heads can be used for grooving. No interference, no continuous breaking up of operations. Automatic oiling. Arbor extended to mount other attachments. Miter gauge, and novel design rip gauge, with four extension rods and support bar (not shown) make difficult work possible. Rip gauge is always parallel to saw blade regardless whether table is raised, lowered, level or tilted. No other saw like it. No changing of pulleys and plenty of power to spare. Users enthusiastic in their praise.

Make these beautiful things, and hundreds of others; there is practically no limit to the work the DELTA HANDI-SHOP will do.



If You Would Gratify Your Desire

to make things—develop your creative and inventive ability—better your health through interesting diversion—increase your profits by enabling your men to turn out faster and better work—earn money in full or spare time—then by all means send for interesting literature describing all our different models, and other Quality-Tools. *Don't delay—mail the coupon NOW!*

A small down payment brings this complete workshop to you. You are not obligated to keep it unless you are satisfied. Try it out and test it in every way possible and, if you like it, (and we are sure that you will) keep it and pay balance in convenient monthly payments while you use it.

10 Days Free Trial—Free Blue Prints

Delta Specialty Co. (Dept. MP228)
858 3rd St., Milwaukee, Wis.

Send me your illustrated color folder describing Delta Handi-Shop. Tell me about your Free Trial Offer, Free blue prints and Easy Payment Plan.

Name.....

Street Address.....

City.....State.....

Cunningham RADIO TUBES

CX326 — C327

Answer A C requirements in modern Electric

Radio Reception

THE popular demand for the latest and most improved A C power receivers calls for the latest development in A C tube construction.

Cunningham A C tubes CX-326 and C-327 are outstanding in their performance and will bring your A C power receiver up to its highest efficiency.

See that these two tubes are doing their duty along with other Cunningham tubes in your A C receiver.

With A C Power Receivers Use Cunningham A C Tubes

E. T. CUNNINGHAM, INC.
NEW YORK CHICAGO
SAN FRANCISCO

New Model

Pocket Ben

A reliable watch will help you be on time.

The New Model Pocket Ben is that kind—thoroughly trustworthy.

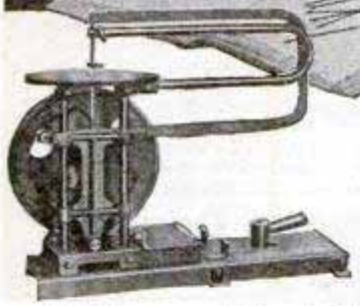
It's goodlooking, too—and sturdy as they make them.

Sold everywhere for $1.50. With luminous dial that tells time in the dark, $2.25.

Built by the makers of Big Ben and other Westclox

WESTERN CLOCK COMPANY
La Salle, Illinois

I'll loan you a SpeedWay Shop-just to prove you can make things like this!



Jig Saw

This Pattern Maker's Jig Saw is part of the Model "88" Shop. Follows a perfect line. Extra blades included free.

Bench Saw

Built heavy and strong. Set into place and operated in 5 seconds. Rips, mitres, grooves, cross cuts.

Get Your Magazine Basket Quick!

While they last, we are giving away the lumber to make the beautiful magazine basket shown at the left. It is yours to keep even if you should decide to return the shop. Act at once before they are all gone. Instructions for making it are included, of course

Yours for The Asking

Everyone who fills in and mails the coupon will receive free of all charge, illustrated plans and instructions for making this beautiful Priscilla Sewing Cabinet. Perhaps you read about it in the October Popular Mechanics but I want to show you how to make it in one-fourth the time on my MOTORIZED work bench—the SpeedWay Shop!

Discard Your Hand Tools

Don't let hand tools put a limit on your Craftsmanship. Let me show you how to start with this simple Priscilla Cabinet—go on into grooving, mitreing, mortising, scroll work, wood turning—make Humidors, Fancy Gateleg Tables, etc. Why limit your ingenuity when it is so easy to own a SpeedWay Shop? Remember—SpeedWay is the Shop used by Manual Training instructors everywhere.

Motorize Your Work-Bench

You can be sure you're getting the right shop when you realize that SpeedWay alone has been serving the World's Industries with Portable Electric Tools for the last twenty years. I want you to examine the exclusive features of a SpeedWay Shop.

Trivial Down Payment

We'll show you how to earn or save the small down payments that come due just once a month. So simple, too, for any man who knows his ABC's about tools. Ask what Mr. Watts of Miami, Fla., did. Send in the coupon today!

Free Trial and Instructions Free Plans and Materials

We are anxious that every owner of a SpeedWay Shop shall get the maximum pleasure and profit from it. That's why we have established the SpeedWay Personal Service Department. This service is free to you. Use it!

24 Blue Prints FREE

With each Shop we include 24 Blue Prints of Furniture, Toys, etc., that anyone can make with the SpeedWay Shop. Mr. L. L. Hull in charge of our Personal Service Dept., will answer your special questions. Here is a real service department at your beck and call.

Free Crafts Books

When we receive your coupon we will send you a list of the best books on Craftsmanship from which to make your selection to be sent free with your shop.

Quick Action Needed!

We cannot continue Special Offers like this indefinitely. Use the coupon today and we will send the Priscilla Cabinet plans and Instructions at once.

ELECTRO MAGNETIC TOOL CO.
Department 2F 1832 S. 52nd Avenue
CICERO (Adjoining Chicago) **ILLINOIS**

MAIL TODAY

Electro Magnetic Tool Co., Dept. 2F, 1832 S. 52nd Ave., Cicero, Ill.

Gentlemen:

Please send me free the complete plans and instructions for making the Priscilla Sewing Cabinet shown above. Also complete details about your Shop and free offers.

Name.....

Street.....

City.....State.....

My age is.....Occupation is.....

I will use Shop for fun [ ] or profit [ ].

Only $1 Down Brings You Either of These Guaranteed Eliminators

ELECTRIFY ANY RADIO

Super-Power "A" Eliminator

This eliminator completely replaces "A" Batteries and the bother and expense of chargers with their disappointments. Here is constant, smooth, unvarying, humless current at 6 volts for any radio using 201-A and power tubes.

Not a Battery-Charger Combination

Large capacity rectifier in this super-power **"A" Eliminator** changes alternating house-lighting current into direct current. Highly efficient heavy duty filter system then changes pulsating direct current from rectifier into smooth, even current for lighting of filament in radio tubes. By simply attaching this **"A" Eliminator** to your set and plugging in the electric light socket your set is instantly supplied with the correct amount of hum-free current. **Requires no attention, as there are no batteries to be charged.** Always reliable whether used once or a thousand times a year. Has no moving parts to wear out. Operates from light socket 110-120 volts, 50-60 cycle A. C., output 6 volts for all sets up to 10 tubes with power tubes.

Test It for 30 Days

Just fill out the coupon below and send it to us with one dollar. We will send you this Super-power **"A" Eliminator.** Try it for 30 days before you pay another cent. If it fails to make good in any way return it at our expense and your money will be cheerfully refunded. Because of our great buying power we are able to offer you this **"A" Eliminator** at less than it is sold for elsewhere. It is offered complete for only **$32.50** payable in easy installments after you test it.

Super-Power "B" Eliminator

This eliminator **permanently replaces "B" Batteries** and the constant expense of getting new ones. Attached to your radio and plugged into light socket it delivers a steady flow of power. Hum, noise, distortion and all other disturbances are gone. **Used with any good "A" Eliminator it completely electrifies your set.**

Complete with Raytheon Tube

This super-power **"B" Eliminator** can be used with any set up to 12 tubes. It comes complete with full wave rectifying 125 Mil. Raytheon tube, making possible the delivery of great current at a high voltage. This Raytheon tube has indefinite life as it has no filament to burn out. Delivers up to 180 volts.

The case is beautifully finished in olive green Duco with black panel etched in gold. Equipped with rubber-covered cord and socket plug. High voltage taps and variable adjustments enable the use of new power tubes. Operates from 110-120 A.C., 50-60 cycle current. Has tap for intermediate voltage, on which 67½ to 90 volts may be obtained. The detector tap will supply 22½ to 67½ volts. Variable adjuster will deliver any desired detector voltage. On and off switch and high and low voltage switch are integral parts of the eliminator. No additional switches or cords are necessary.

Test It for 30 Days

We make you the same liberal trial offer with this **"B" Eliminator** as with the **"A" Eliminator** described in this advertisement. Ordinarily this **"B" Eliminator** ordinarily sells for the cash price of $42.50. You can buy it on easy installments for only **$29.50** after you have tested it.

AT REDUCED PRICES

NO BATTERY—NO CHARGER
NO BATTERY—NO BULBS
NO HUM
Nothing to wear out or replace

COMPLETELY REPLACES "B" BATTERIES
Easy to attach
Plug into electric light socket

Mail This Coupon NOW!

ELLIOTT RADIO CORPORATION, Dept. 398
709 West Lake Street, Chicago, Illinois

Attached find $1.00 for which you agree to send me ( ) **"A" Eliminator** at $32.50. ( ) **"B" Eliminator** at $29.50. (Send $2.00 if both are desired as described in ad.) Full particulars will be sent me by return mail and my money refunded if I do not accept your offer.

Name _____

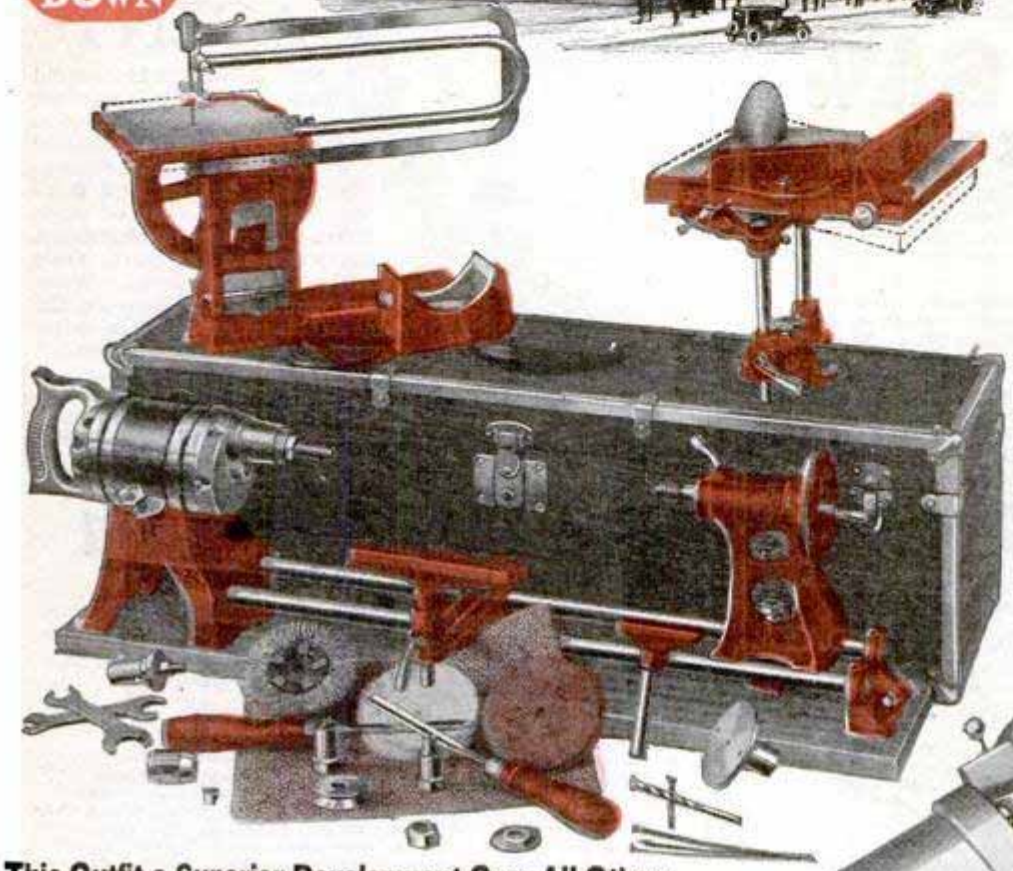
Address _____

City _____ State _____

ONLY $10 DOWN

UP-TO-DATE MACHINE WORKS

SENT ON TRIAL



THE FIRM BACK OF THE UP-TO-DATE MACHINE SHOP

For 15 years "Up-to-Date Machine Works" has been a standard of perfection in mechanical production. It has built its business and increased production about the substantial guarantee placed on every one of over 1,000 commodities. **"We place an unconditional guarantee as for satisfaction. If upon receipt of your order you find it is not up to standard, without question or delay every cent refunded."** Such is the organization which manufactures, distributes and instructs owners of the Up-to-Date Home-Craftsman Shop.

This Outfit a Superior Development Over All Others

The Up-to-Date Home-Craftsman Shop can be used in any home lighting fixture, making of your old fashioned work bench a complete machine shop. Complete it is made up of a Super-Power Motor, a precision lathe (10" x 34"), featuring the bevel, a miter, side and depth gauges, a tilting table, jig-saw, and all accessories for buffing, grinding, cleaning and all portable or stationary drilling and sawing. This equipment will make you an advanced craftsman. Master mechanics have designed and skilled engineers have constructed this equipment which, after inspection, you will agree is the best of its kind. For those who build, invent, create and construct at home, it is unexcelled.

THE SUPER-POWER MOTOR

This motor, the drive power of our shop equipment, is positively the latest development in electric drill motors. It is guaranteed as for complete satisfaction. It produces ½ H.P. operating on 110, 220, or 32 volt currents either A.C. or D.C. and is guaranteed not to burn out or wear out in the ordinary use of home or factory. It drives the lathe, circular saw, jig saw, a 14" band saw, a 4" jointer with amazing power and durability. For further details on this Super-Power Motor and the perfected shop it operates, mail the coupon below **TODAY.**

Our Latest Development

12" Band Saw

This, the latest development in band saw equipments, supplied with tilting table, miter and side gauge, complete semi-steel construction; operated with either individual motor or regular Up-to-Date Super-Power Motor. For complete details mail coupon below.

Individual Headstock

Supplied where no electricity is available. This headstock can be operated by gasoline engine, individual motor, or line shaft. Included with our regular Up-to-Date Home-Craftsman Shop upon request. Note circular saw arrangement together with lathe bed.

Our Educational Department

Under Personal Supervision of Master Craftsman Eugene E. Maurey offers special correspondence crafts course, giving in simple detail full information on home handicraft. Blue print service included in this course FREE to our users.

THE UP-TO-DATE GUARANTEE

After receipt of the Up-to-Date Home-Craftsman Shop if you are not satisfied, without question or delay, every cent refunded and return express charges paid.

Carefully Designed Blue Prints FREE TO SHOP OWNERS

Working blue prints of furniture and other items which are useful about the home and shop. Hundreds free to shop owners.

YOUR own terms on purchase. $10.00 down—balance arranged to your convenience. Liberal discount for cash.

4' Jointer MODEL A-1928 **Accessory to Up-to-Date Shop**

10 DAY FREE TRIAL

Use our shop for 10 days at our expense, if not satisfied—Return—express collect.

MAIL THIS For Full Particulars To

UP-TO-DATE MACHINE WORKS
2915 South Wabash Ave.,
Chicago, Ill.

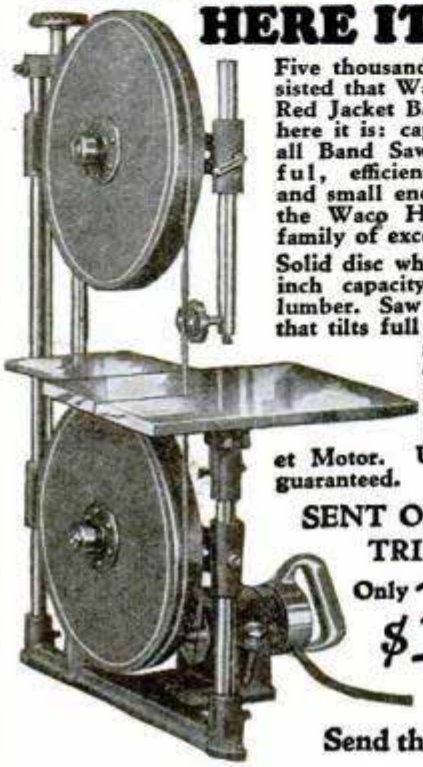
MANAGER, Dept. S:—Without any obligation, please send me full particulars about your shop, 10 day free trial, free blue prints, free crafts course. Also $10.00 down payment offer.

Name.....

Address.....

The New Red Jacket BAND SAW

HERE IT IS!



Five thousand craftsmen insisted that Waco produce the Red Jacket Band Saw. Now here it is: capable of doing all Band Saw work, powerful, efficient, dependable, and small enough to fit into the Waco Home-Workshop family of excellent tools.

Solid disc wheels giving 12-inch capacity on four-inch lumber. Saw table 9" x 12" that tilts full 45 degrees for all miter requirements. Direct gear drive from the famous Red Jacket Motor. Unconditionally guaranteed.

SENT ON 10-DAY TRIAL

Only $35.00

Not Including Motor

Send the Coupon

WACO TOOL WORKS, Inc.

Waco Tool Works, Inc., Dept. 102-A,
542 North Parkside Avenue,
Chicago, Illinois.

☐ I am enclosing $31.50. This is the full price less 10% for cash.

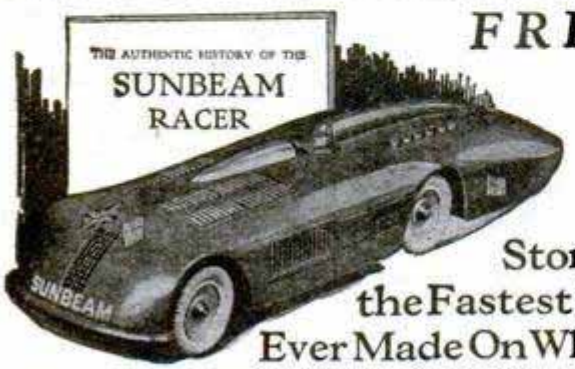
☐ I am enclosing $10.00 as down payment and if I keep this band saw, I will remit $10.00 monthly.

This band saw is sent on 10 days trial and may be returned for full refund.

Name.....

Address.....

City and State.....



FREE!

Story of the Fastest Ride Ever Made On Wheels

203 miles an hour—more than 3 per minute! The thrilling true story of the Mystery Sunbeam racer, fastest auto in the world. Free, with full description of the toy size Kingsbury Sunbeam—fastest toy on wheels. Bright red, with big rubber tires, powerful clock-spring motor. Only $3. If your dealer hasn't it, order direct. (West of Miss., or in Canada, $3.25). Kingsbury Mfg. Co., 83b Myrtle St., Keene, N. H., makers of KINGSBURY MOTOR DRIVEN TOYS.

Send 10c for Kingsbury Disc Wheel Eraser. Complete Toy Catalog Free.

AGENTS

HERE is a new Household Device that beats a vacuum cleaner and all attachments. It not only sweeps thoroughly and cleans walls and ceilings but also washes and dries windows and scrubs and mops floors. Requires no electricity. Every home a prospect. Only $2.95. Over half profit. Write your name and address at the edge of this ad and mail to us today for complete selling terms.

HARPER MFG. CO.
543 6th St., Fairfield, Iowa

Make $12 a Day

With this Amazing Trade-In Deal

$2 allowed for old irons! Sensational Opportunity! Make $60 to $90 a week trading in old irons at $2 apiece (we stand expense) to quickly introduce amazing **New Self-Heating Iron**.

Cuts ironing time in half. Makes ironing easy in every home. Ends hot stove drudgery. Saves steps. Costs one cent for 3 hours' use. No attachments. No cords. No tubes. Gives quick, regulated heat. Guaranteed. Sells fast. Mrs. Wagner, Ohio, sold 24 in few hours spare time. Moyer, Pa., made $164 in one week. You can do as well. Work all or spare time. No experience nor capital needed. New plan. Simply accept orders and trade in old irons at $2 each. We deliver and collect. Commissions paid same day you take orders. Write quick for exclusive territory and FREE OUTFIT OFFER.

AKRON LAMP CO. • 32 Iron Bldg., Akron, Ohio

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Direct from the manufacturer. Completely wired, including glassware. Send for new catalogue No. 29. Just Reduced Prices. *Special Proposition to Dealers.*

Erie Fixture Supply Company, Inc.
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Many models of genuine MOVIE MACHINES, some as low as $3.75, all using standard size big theatre films. Our stock of films is the most complete and lowest in price—with an exchange service. Films of leading stars and religious subjects are available. DON'T DELAY. WRITE FOR FREE INTERESTING CATALOGUE NOW!

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Plows
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A Powerful Tractor for Small Farms Gardeners, Florists, Nurseries, Fruit Growers and Poultrymen
DOES 4 MEN'S WORK
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4 SHIP MODEL PLANS $1

Plans and instructions for VICTORIA, Pirate ship, Clipper ship, HALF MOON—all for $1. Big Bargain—Send NOW. Interesting catalogue 6c.

SEA ARTS GUILD
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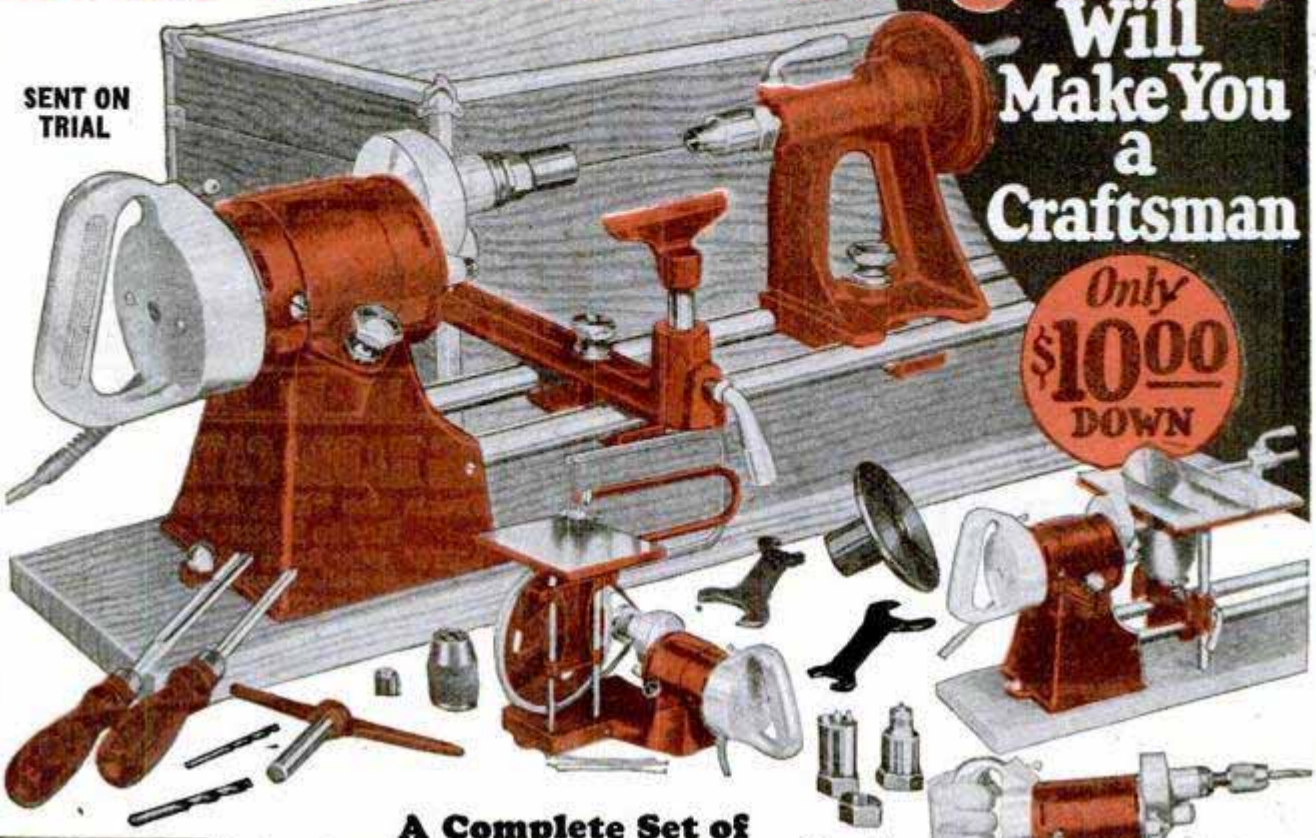
This Wonder Working Shop Will Make You a Craftsman

SENT ON TRIAL

Only $10.00 DOWN



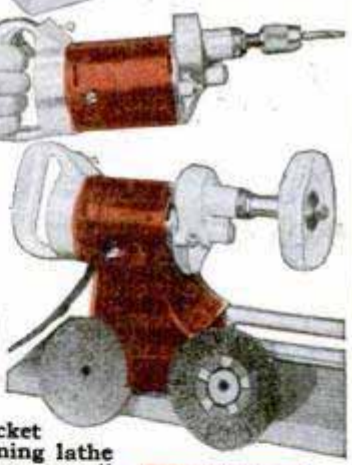
A Complete Set of Craftsman's Home Working Tools

Red Jacket electrically driven tools turn out work like magic. A complete made to order workbench equipment of perfect, efficient and powerful craftsman's tools that are small and compact enough for portable use and so inexpensive that any man or boy may have one.

Red Jacket Waco Craftsman's Lathe

RED JACKET—A *chest* full of tools designed by a master for the private use of tool lovers and men who want to build, construct, invent and create at home. You will be able to make everything—attractive odd furniture, toys, home and garden improvements, all around manufacturing, repairing.

THE COMPLETE EQUIPMENT consists of a powerful Red Jacket Drill Motor, with direct drive to the Waco precision wood turning lathe (capacity 9 in. x 34 in.); a bench saw, that has depth and side gauges, scroll and jig saw; and all accessories for both portable and stationary power drilling, buffing, grinding and cleaning. Attaches to any light socket and converts your work bench into a complete private tool and machine shop.



Turning
Sawing
Winding
Spinning
Grinding
Buffing
Polishing
Cabinet Making
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Drilling
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Pointing
Jointing
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Successful Master-pieces

Special Crafts Course FREE

SPECIAL CRAFTS COURSE and blueprint service is free to Red Jacket Shop owners—all that there is to know about handicraft methods, raw materials, woods, carving, sawing, turning, designing, carpentering, decorating, is taught by special correspondence.

Buy On Your Own Terms

Only $10.00 down. Liberal discounts for cash. Easy monthly payment plans. It is no hardship to own a Red Jacket.

10 DAYS' FREE TRIAL

Our literature tells you how to start a job of your own. If you are not pleased return the Shop.

This Headstock furnished where no electricity is available. →

Interesting Literature Free

Send the coupon. You will be surprised with all it contains. Beautiful, Instructive, Fascinating, Interesting. →

The Waco GUARANTEE

If It Is Not What You Want When You Get It— Send It Back.

Look out for imitations. There is only one Red Jacket—one Waco—one Wm. L. Aylward, Master-craftsman.

WACO TOOL WORKS, Inc.
542 N. Parkside Ave., Chicago

Manager, Dept. 101. Please send me particulars about 10-day free trial, free blueprints, and $10 down payment.

Name.....

Address.....

You can candle
an *egg*-but not a *battery*

THERE isn't much difference in the size or shape of batteries. And you can't tell how good they are before you use them. ¶ If you could, one element alone would win your preference for Burgess. That element is *Chrome*. ¶ *Chrome* is the *preservative* that maintains an abundance of unfailing energy in Burgess Batteries—long after most dry cells cease to function. The black and white stripes are individual marks for identifying Burgess *Chrome* Batteries. Buy them for long lasting, dependable performance!

Chrome—the preserving element used in leather, metals, paints and other materials subject to wear, is also used in Burgess Batteries. It gives them unusual *staying* power. Burgess *Chrome* Batteries are patented.

Ask Any Radio Engineer

BURGESS BATTERY COMPANY
General Sales Office: CHICAGO
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BURGESS BATTERIES

RADIO · IS · *BETTER* · WITH · DRY · BATTERY · POWER

Improves-
tone fidelity, clarity, sensitivity—by automatically keeping tube filament voltage constant, despite "A" battery variations.

AMPERITE
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The "SELF-ADJUSTING" *Rheostat*
eliminates hand rheostats. Simplifies wiring, tuning, panel design. Particularly essential with Battery Eliminators. Accept only Amperite. $1.10 mounted (U.S.A.)

FREE—"Amperite Book" of latest circuits and construction data. Write Dept. PM-2

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BIG RADIO CATALOG
From the "Big, Friendly Radio House"
NEW 1928 Book offers finest, newest well-known sets; parts, eliminators, accessories at lowest prices. DEALERS—WRITE for this CATALOG!

Western Radio Mfg. Co.
132 West Lake St., Dept. 32, CHICAGO, ILL.

Free Wholesale Radio Catalog
Send for it today
1928 Catalog
Dealers, set builders—make this your biggest radio season. Shure's great wholesale catalog insures the best in quality at lowest prices.
This wonderful book is jammed full of the newest offerings of Nationally known radio parts, kits, sets, accessories, table and console cabinets, etc. Also contains short wave section showing the finest electrical apparatus for short wave receiving and transmitting. Your request on letterhead brings our book of a thousand bargains, price list and discount sheet. Write for a copy today.

2000 Items
Big Values

Shure Radio Company
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CANARIES GOLD FISH, CAGES AND SUPPLIES
Big bargains in guaranteed singing Canaries, Parrots and Fancy Birds. Complete stock of cages, supplies and remedies. Write today for FREE instructive booklet and catalog.
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MEN'S STRAP WATCH
DIRECT FROM SWITZERLAND
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Radium Dial
Jeweled Movement
Silveroid Cushion Shaped Case

This fully guaranteed watch cannot be manufactured in America for less than $12. Genuine leather strap. Accurate—durable—handsome. SEND NO MONEY. Pay on delivery $3.99 plus postage. "FED CO."
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30 Days FREE TRIAL

Single Control 7-Tube

$77

RETAIL PRICE

Completely Assembled

The Randolph

SINGLE CONTROL — ILLUMINATED DRUM

Powerful 7-tube radio at factory price. Test it without spending a cent. We claim the Randolph Seven will out-perform any radio and we want you to satisfy yourself that it will. To do this, we will send you this powerful radio to try for 30 days. Test it for distance, clearness, ease of operation, tone and every other way you can. Unless it more than satisfies you, return it to us. **Every Randolph set must make good before it is sold.**

Battery or All-Electric Operation

The Randolph Single Seven is sold for use with batteries or connected for operation direct to electric light socket—absolutely batteryless—no chargers or batteries—just **plug in** socket and **tune in.** 100% efficient either way. Its construction and performance have been tested and approved by leading radio engineers and authorities and leading radio and scientific publications.

Single Control—Illuminated Drum

One drum dial operated by one simple vernier control tunes in all stations with easy selectivity to tremendous volume. No overlapping of stations. Illuminated drum permits operation in the dark. Volume control for finer volume modulation. This is a 7-tube tuned radio frequency receiver with power transformers and power amplification. Space wound solenoid coils. Full and completely shielded. A real receiver of the highest quality. Tremendous distance, wonderful tone quality, simple to operate.

The Randolph cabinets are in themselves beautiful pieces of furniture made of carefully selected solid burl walnut. Bas-relief bronze escutcheon plates are mounted on the dial panel. In design and appearance it is a cabinet worthy of the high-quality radio it contains. Solid walnut beautifully shaped surrounds the soft verdi-green panel.

Nothing has been spared to make the Randolph Seven the leading radio receiver. We are so sure that it will surpass even your best hopes that we know how safe we are in making the **30 day free trial offer.**

Read What Owners Say

I have logged more than 50 stations from coast to coast. —Lloyd Davenport, Littlefield, Texas.

I have logged 52 stations from Cuba to Seattle—the set is a world beater. —J. Tampkinson, Detroit, Mich.

Your set is a revelation—has all others tied to the post for distance and selectivity. —Waldo Powers, Vergennes, Vermont.

On strength of its performance sold two more sets this week. —T. Scanlow, Orlando, Florida.

Beautiful Ampliphonic Console Set

Made of the finest carefully selected solid walnut. Two-tone shaded finish. Has built-in cone loudspeaker that compares with any on the market and accurately reproduces high and low notes. Send for the folder today that shows this beautiful console in full colors and gives complete details. **Compares with most table sets in price.** For **battery or all-electric operation** ready to **plug in** and **tune in.** Write for complete descriptions.

RANDOLPH RADIO CORPORATION

711 W. Lake St. Dept. 400 Chicago, Ill.

Biggest Discounts to Agents and Dealers

WORK either full or part time and make big money. Tremendous advertising campaign helps you sell. Regardless of whether you have ever sold before, be sure to get our proposition. The Randolph sells on first demonstration. Men and women both can make money this easy way. Get your demonstration set for 30 days **FREE TRIAL.**

6-Tube

$55

Retail Price

Single Control

The Randolph

New, modern, single control, 6-tube radio. Do not compare this set with old style 2-dial 6-tube sets selling for same price. The Randolph 1928 Senior Six has been tested and approved by leading radio engineers. Comes in a beautiful solid walnut cabinet of hand-rubbed finish. Single control. Illuminated Drum with space for logging. Absolutely dependable and very selective. **Sent for 30 Days Free Trial. You test it before you buy.**

MAIL COUPON NOW

The Randolph Radio Corporation are **pioneers** in the manufacture of **radios.** All of its vast and unlimited resources have been used in making and perfecting of the Randolph Receivers. We know what it will do. Mail **us** the coupon **now.**

Use This Coupon Today!

Randolph Radio Corporation,
711 West Lake Street, **Dept. 400**
Chicago, Illinois

Send me full particulars about the RANDOLPH Six and Seven-Tube Table and Console Sets with details of your **30 Day FREE Trial Offer.**

Name.....

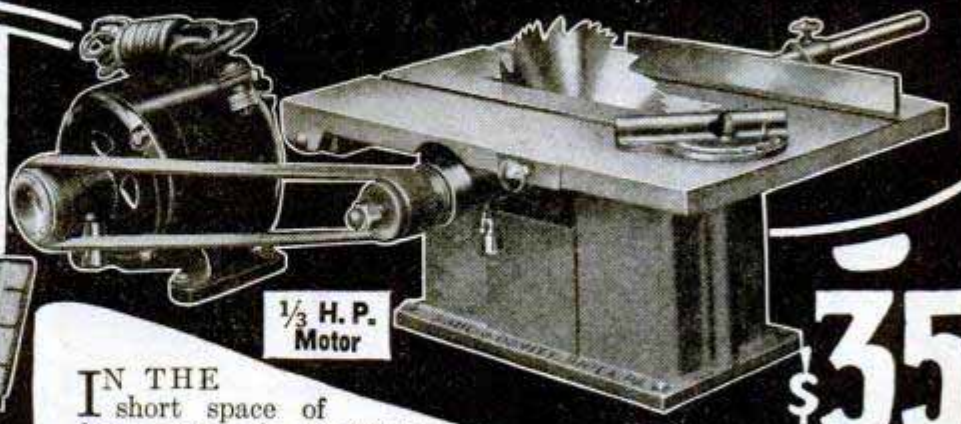
Address.....

City..... State.....

Mark here ( ) if interested in Agent's proposition.

DEVITT 8" COMBINATION SAW
8,000 IN USE!

A SHOPFUL OF TOOLS WITHIN ARMS REACH!



$35 F.O.B. PHILA

SAW TABLE RAISED SHOWING EMERY WHEEL, SAW GUARD AND DRILL ATTACHMENT

PLANER ATTACHMENT ON SAW TABLE

SHOWING SANDING DISC ATTACHED

TABLE TILTED FOR BEVELING

DADO HEAD ATTACHED FOR GROOVING

IN THE short space of four years, the Devitt 8-Inch Combination Saw has become a practical necessity in thousands of shops, factories and households everywhere. Many imitators have sprung up, but Devitt leads them all. Think of the convenience and economy of this handy little machine that will rip, cross cut, bevel, miter, groove, mortise, tenon, drill, rabbet, grind, buff and polish. Attachments are easily and quicky adjusted. The saw and motor, when set up for work, occupy very little room. Saw is equipped with 1/3 H.P. 60 cycle, 1750 R. P. M. 110-volt A. C. Motor which can be attached to ordinary light socket, and provide power for other purposes when wanted. A cut up to 2¼" can be made without planing. Comes complete with following attachments—12"x16" table, 8" Combination Saw, iron pulley for saw table, 10" ripping fence, adjustable cut off miter gauge, motor-specifications as above, 1¼" endless leather belt, wood pulley, 8 ft. cord and plug, 6" buffing wheel, ⅜" 3 jaw drill chuck, 5" emery wheel, 6" sander, saw guard, and 2" dado insert. $35.00 F. O. B. Phila. Height 7½", shipping weight, 100 lbs.

(Only $12 extra for Planer Attachment to fit on table top. Can smooth pieces up to 2 inches wide. Price, F. O. B. Phila.)

Send today for our attractively illustrated 4-page circular

PAUL J. DEVITT
Dept. D 1102 SOUTH 2ND ST. PHILA., PA.

"Sure-E-Z" the Wonder Dust Cloth

Keeps your car always snappy. Removes mud spatter like magic. Cannot scratch. Protects finish—leaves it dry and clean. Easy to use. Fine for furniture. Guaranteed long lived, dependable. Thousands of satisfied customers. One wash saved pays for several Sure-E-Z's. Full size sample 60c postpaid, stamps or coin. Three for $1.50.

Live representatives wanted—Exclusive territory.

National Supply Company
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AGENTS AND SIGN MEN
Now Making $50.00 to $100.00 and Up Per Week Selling Our
GOLD LEAF SIGN LETTERS

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For store and office windows, board signs, trucks and glass signs. We also make to order script signs and business emblems singly or by the thousands. A permanent business. **No capital or experience required. Big demand in every city.** *Samples and Literature Free.*

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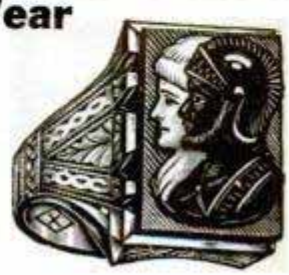
A Ring You Will Be Proud To Wear
SEND NO MONEY
Genuine Full Cut Diamonds (No Chips)

No. 6132. Solid Gold Men's Initial or Emblem Ring. 2 Genuine Diamonds 4-100 each. 14-Kt. White Gold Top. Emblem (any lodge) or any initial (Old English) Yellow or White Gold inlaid in Genuine **Hope Ruby or Black Onyx.** Mention if desired in solid White Gold or Green Gold, same price.

No. 6746. Genuine Double Head Cameo (raised hand-carved heads); 1-piece stone. **Heavy Shank** in White Solid Gold or Green Gold. Genuine Stone—onyx, (nicely shaded). Send number of ring, size of finger, initial or emblem desired, and ring will be sent for inspection.

Terms (6 Mos. to Pay) **Ask for Free Jewelry Catalog**



No. 6746 Exact size of ring. **$24**

$25 **BUFFALO JEWELRY MFG. CO.,** **"The Mail Order House"**
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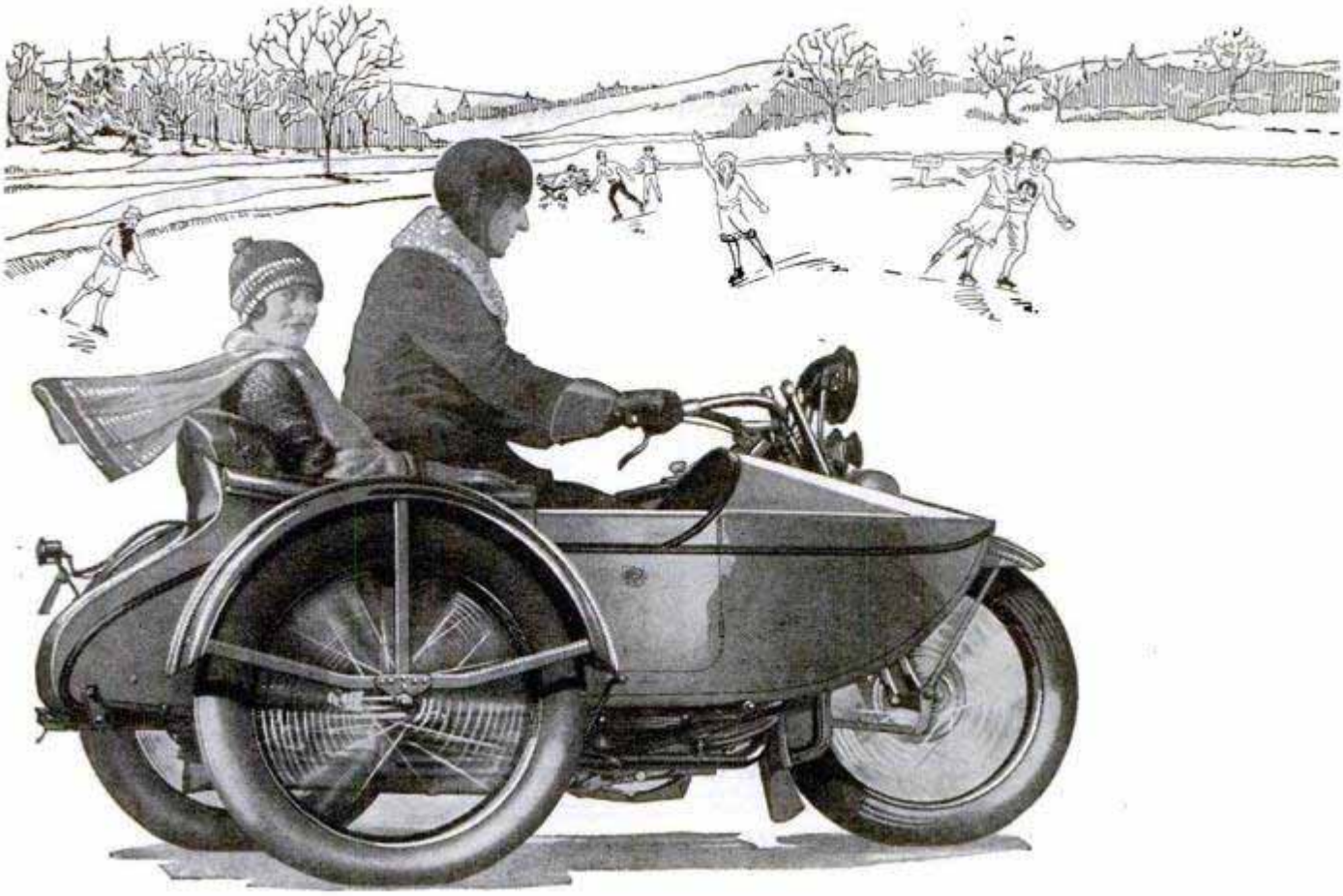
This Reg. ✕ Trade Mark guarantees you genuine diamonds.



No sport like motorcycling —no motorcycle like HARLEY-DAVIDSON

THRILLS, health and the beauty of the open road crowd every mile when you ride a Harley-Davidson. Distance means only the pleasure of covering it. Alone or with a pal in the chummy, comfortable side car you travel the highways or back trails safely and in solid comfort—*and 2 cents per mile is all it costs you!*

Built into the 1928 models are all the improvements learned from 24 years of motorcycle manufacture. Front and rear-wheel brakes, throttle controlled motor oiler and carburetor air cleaner are only a few of the features of this great motorcycle.

Stop today at your local Harley-Davidson dealer and ask for a demonstration and details of his Pay-As-You-Ride purchase plan.

The Single — the famous solo motorcycle that travels 80 miles to the gallon. One cent per mile pays all operating costs. Thousands of men are using it for quick, economical transportation for work and sport.

Send the coupon for our new catalog. Send it now!

HARLEY-DAVIDSON MOTOR COMPANY
Department P. Milwaukee, Wis.

HARLEY-DAVIDSON
Motorcycles

HARLEY-DAVIDSON MOTOR CO.
Dept. P., Milwaukee, Wis.
Send me your catalog. I am interested in
☐ Twin ☐ Single ☐ Dealer Proposition.
Name.....
Street.....State.....
City.....

$351.00 CLEARED IN ONE DAY

So writes W. H. Adams of Ohio. Letter from V. A. Marini of California reports $11,275 sales in three months. Jacob Gordon of New Jersey "$4000 profits in two months." Alexander of Pennsylvania "$3000 profits in four months." Ira Shook $365 sales in one day. Bram bought one outfit April 5 and 7 more by August 28. Iwata, bought one outfit and 10 more within a year. Mrs. Lane of Pennsylvania says "sold 2000 packages in one day." J. R. Bert says "only thing I ever bought that equaled advertisement." John Culp says: **"Everything Going Lovely.** Crispettes wrappers scattered all over town. It's good old world after all." Kellog, $700 ahead end of second week.

WE START YOU IN BUSINESS

Furnish secret formulas, raw materials, and equipment. Little capital required; no experience needed.

BUILD A BUSINESS OF YOUR OWN

No limit to the sale of Crispettes. Everybody likes them. It's a delicious food confection. Write for facts about a business that will make you independent. Start now in your home town.

Profits $1000 a Month Easily Possible

Send postal for illustrated book of facts. It contains enthusiastic letters from others—shows their places of business, tells how and when to start, and all information needed. Free. Write now!

LONG-EAKINS COMPANY
228 High Street Springfield, Ohio

Going to Build Remodel or Repair?

DON'T think of building a new home or repairing an old one without a copy of our free woodwork catalog.

To those who contemplate building or remodeling, this book is a valuable work of reference. In it are found the latest ideas and most advanced styles for everything in millwork. It illustrates and describes **windows and sash of all kinds, including porch and storm sash, doors, frames, mouldings, screens, porchwork, stairwork, hardwood flooring, interior finish, cabinet work—in fact, practically everything in manufactured millwork.** Every article in the book shows a low money-saving price direct to you.

FREE ESTIMATES

Send us your lumber and millwork bills for a free estimate. Let us quote prices on your material and tell you the exact amount of freight. Then compare our prices with others. This service costs you nothing and places you under no obligation whatever.

CHICAGO MILLWORK SUPPLY CO., 1444 W. 37th St., Chicago, Ill.
PLEASE SEND ME YOUR FREE BOOK
Name _____ St. No. _____
Town _____
State _____
Occupation _____

Book is Free

Every Man has the Selling Instinct

I can show you how to start earning **$100 a week** immediately. Salesmen are happy and prosperous—there is no limit to their earnings. I have started thousands of men on the road to financial independence. **YOU can make big money** selling all wool quality suits and overcoats at **$23.50** and **$31.50**—cannot be duplicated at $40. Liberal commissions paid in advance—extra bonus money—steady income from repeat orders. I can make you a successful salesman—let's start NOW—write for **FREE** selling outfit and full instructions.

W. Z. GIBSON, Inc., 500 Throop St., Dept. P-516 Chicago

FREE TO BOYS

"THE SHOOTER'S ART" Tells how to hold, aim and handle rifles; helps you guide others in correct knowledge of guns. **Gives facts that make crack shots.** Contains safety and common sense instruction every parent and boy should have. **Helps to make boys leaders.** Your copy Free. Write at once.

Send Now!

The NEW BENJAMIN Air Rifle

Outshoots All Others

America's Original Air Rifle

BENJAMIN $5 *at your dealer's or sent postpaid. Write!*
Air Rifle & Mfg. Co., 845 N. Broadway, St. Louis, Mo.

The Shooter's Art

DO YOU

WANT a new business profession of your own, with all the trade you can attend to? Then **become a foot correctionist,** and in a few weeks earn big income in service fees,—not medical nor chiropody—easy terms for home training, no further capital needed, no goods to buy, no agency. *Address*

Stephenson Laboratory, 1 Back Bay, Boston, Mass.

5 TUBE RADIO ONLY $19.98

It's a wonder for power and selectivity. Famous ARL circuit. Coast to coast reception! Finely built of selected, tested parts. Thousands now in use. **FREE Log and Call Book** and New 132-p. Catalog with thousands of nationally advertised bargains. Latest in radio at big savings. Write for Free copy.

AMERICAN AUTO & RADIO MFG. CO.
HARRY SCHWARTZBERG, PRES.
Dept. 261 American Radio Bldg., Kansas City, Mo.

AMERICAN RADIO BARGAINS

Automatic Concertina Played With Interchangeable Rolls.

Musical Entertainers wanted everywhere and earn big money at Moving Pictures, Vaudevilles, Cabarets, Restaurants, Inns, Lunch Rooms, Outings, Dances, Weddings, Fairs, Parties, or travelling with shows all year. Entertainers charge $10.00 per evening. Our **AUTOMATIC CONCERTINA, played with interchangeable Rolls** offers opportunity, to make big money or steady side income. **You play perfect in 30 minutes** Songs, Dances, Operas, Marches, Waltzes, Fox Trots, One Steps, etc. without a faint idea of music or notes. Beautiful tone and melodious as played by artists. The **AUTOMATIC CONCERTINA** possesses a charm, which no one can escape. The player is actually playing, **without any study or practice.** Attractive professional cards furnished without charge, lead to an income for lifetime. **AUTOMATIC CONCERTINAS** are used in Song and Dance Acts on the stage. Three Models for Home, Concerts, and Paid Entertainers, from $30.00 to $60.00. Descriptive circular number 2 mailed free.

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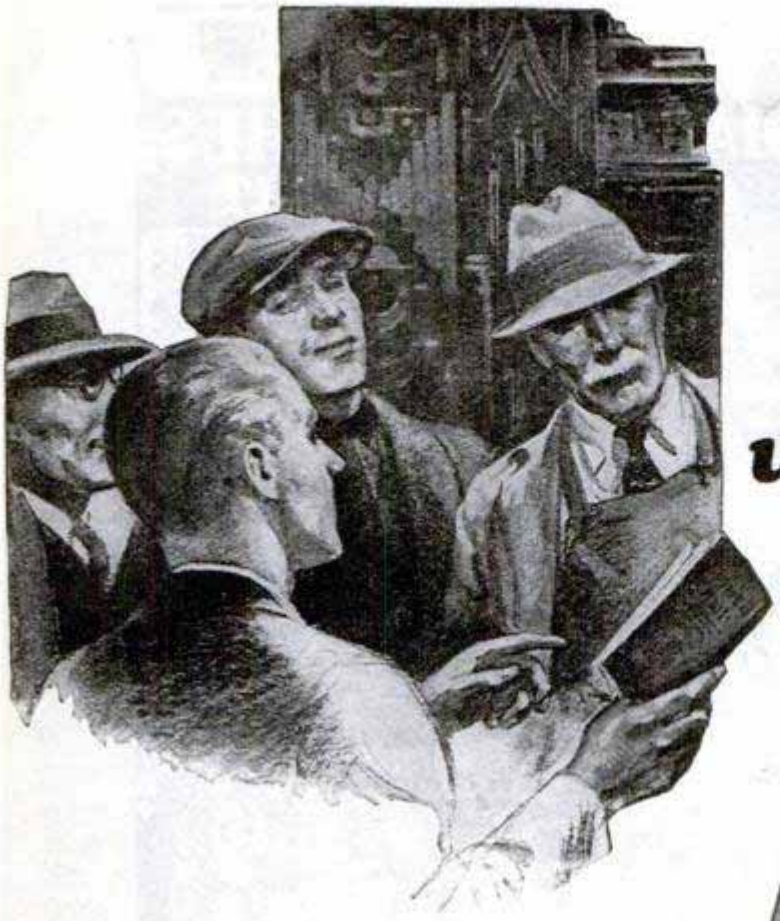

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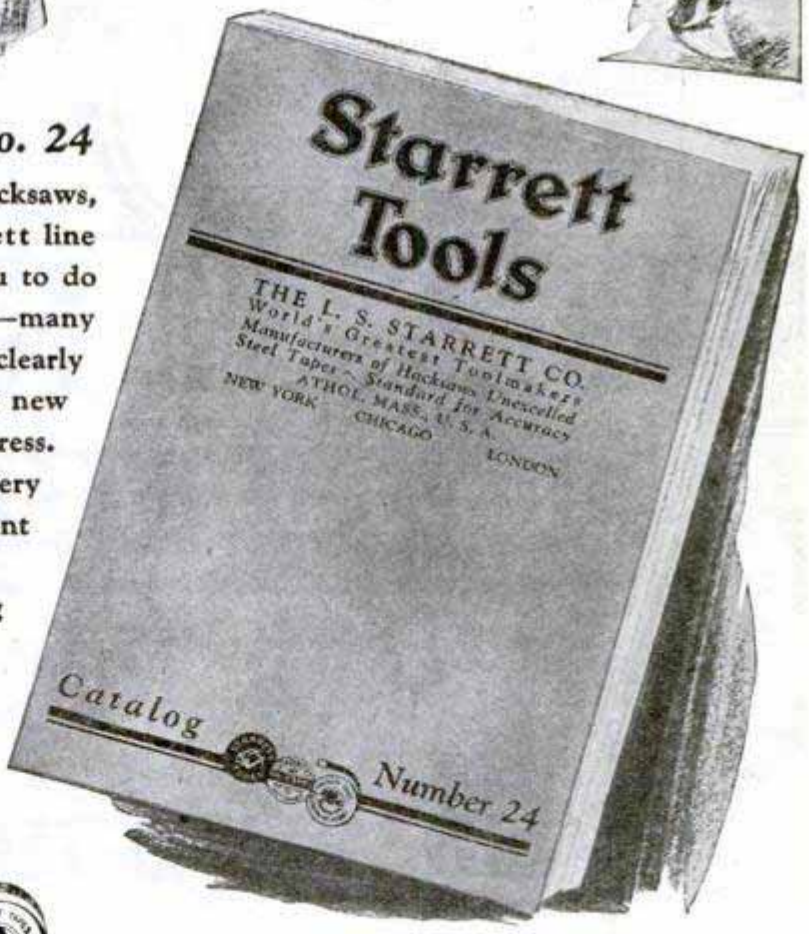

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LOFTIS BROS. & CO. Est'd 1858

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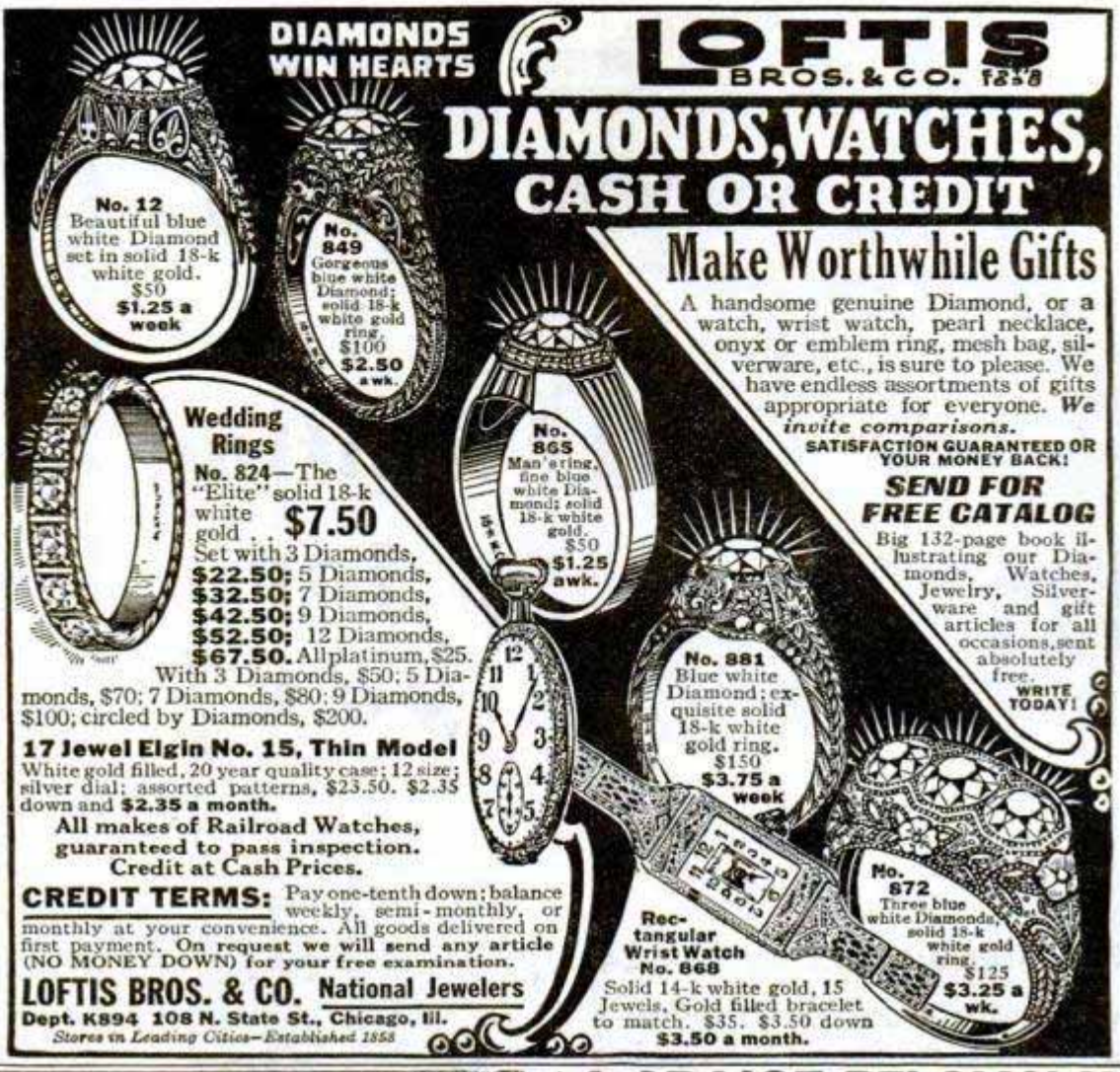

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White gold filled, 20 year quality case; 12 size; silver dial; assorted patterns, $23.50. $2.35 down and **$2.35 a month.**

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make your old kerosene lamps and lanterns give a brilliant white light better than electricity or gas. Doubles your light. Saves oil. **NO MANTLE TO BREAK.** Guaranteed Safe and Reliable. Delights every user. Send now for complete sample postpaid 50 cents, stamps or coin, 3 for $1.25. **Money Back If Not Satisfactory.**

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MAKE BIG MONEY—We supply stock and pay you following prices for all you raise: Belgian Hares $2 each—New Zealands $3 each—Chinchillas $4 each—Flemish Giants $5 each. 32-page illustrated book, catalog and contract, also copy of **Fur Farming** magazine, tells how to raise skunk, mink, fox, etc., for big profits, all for 10c. Address

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How Far Did 'LINDY' Fly?

FROM NEW YORK TO PARIS

Solve this Puzzle

The letters on the wing of this plane show the number of miles Lindbergh flew from New York to Paris. The letters in the alphabet are numbered—A is 1, B is 2, etc. Put down the number represented by each letter (C F A I) in the order they appear and you will have the number of miles Lindbergh flew from New York to Paris. Can you work it out? Send your answer today—no obligation or cost to you now, later, or ever. Be wise

AND WIN BUICK or $1800 Cash

I am going to give this beautiful new 1928 four door Buick Sedan, also a 1928 Nash Sedan also a 1928 Essex Sedan, also a 1928 Chevrolet Sedan—four cars and a large list of additional costly prizes—over $5000.00. Cars will be delivered free to winners by nearest auto dealers. I have already given over fifty new automobiles to advertise our business and now YOU can get this new Buick Sedan or cash if you wish. You can win it. It costs nothing to try. First prize winner can have Buick or cash value of car ($1295.00) and

4 Cars Given

$505.00 EXTRA For Promptness!

Be prompt—just figure out what number each letter on the wing of the plane represents. Put them down in order shown. Mail me your answer with your name and address. That's all. Send no money. No obligation. All who answer can share in cash and prizes. In case of ties duplicate prizes given. Everybody rewarded. Hurry! $505.00 cash extra for promptness.

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Watch Sent on 30 Days Free Trial

Send No Money

In addition to our New Low Price, I will send for your approval one of these Standard Watches, guaranteed for a lifetime of satisfactory service, not only by the Santa Fe Watch Company, but by the Great Illinois Watch Factory. They are found in the pockets of men in the service on every railroad in this country. Senators, Congressmen and Governors keep their official appointments by "Santa Fe Special" time. Army officers and Privates carried them all through the Greatest War in history—thousands of these splendid watches are in use all over the World. If you want one on my liberal new LOW PRICE PLAN, you had better write for my Free Watch Book today and make your selection without delay. I will send the Watch for you to see WITHOUT ONE PENNY DOWN—I will even allow you to wear the Watch 30 days FREE—then sell it to you on a binding money-back guarantee.

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Please send prepaid and without obligation your Watch Book Free, explaining your "No Money Down" Offer on the Santa Fe Special Watch.

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IT'S one of the most popular instruments in an orchestra. And it's easy to learn to play. With a few short lessons you can run the scales. Before you know it you'll be playing hundreds of fascinating melodies. The ideal trumpet for all orchestra and solo work is the PAN-AMERICAN. It has a brilliancy and color range that musicians appreciate. It's the "trick" instrument of every band and orchestra.

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YES—Send me complete information on PAN-AMERICAN Trumpets and other band instruments. I would like to learn to play.....(instrument).

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DON'T SEND US A CENT—we'll ship you a *genuine* L. C. Smith for a 10-Day Free Trial. Put it to any test in your home or office—no one will urge you to buy. Compare it with any machine made. Then, if you decide to keep it, we'll make you the LOWEST PRICE EVER OFFERED and give you EASY MONTHLY PAYMENTS so small you'll never miss them.

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With plumb bob in polished hardwood case, hinged leg tripod, 8 ft. rod, target, instruction book. Ideal for draining, ditching, tiling, irrigating, fencing, road building and for laying out orchards, gardens, farm lands, etc. Also improved type convertible level and transit for $50. *Satisfaction Guaranteed.*

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Cards, stationery, circulars, tag, labels, paper. **Complete Outfits, $8.85 up,** Job Presses $11 up, Rotary $149. Card Cutters, $3. Save money. Print for others, big profits. All easy rules sent. Write for catalog presses, type, paper, cards, ink etc. **THE KELSEY CO., N-37, Meriden, Conn.**

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GENUINE GOLD LEAF LETTERS

S guaranteed to never tarnish. Anyone can put them on stores and office windows. Enormous demand, large profits. Paul Clark says: Smallest day $28.70. R. L. Reel made $920 in two months. Write today for free sample and liberal offer to general agents.

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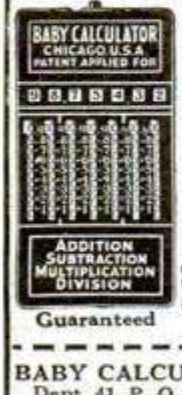

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Made of steel and indestructible. Million dollar capacity. Fits in pocket. Will not make mistakes. So simple child can operate it. Instructions furnished. Everybody should carry one for figuring.

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Our new plan enables you to get one of our fine made-to-order suits, in any style you want, without one penny cost to you.

FREE New, Big Sample OUTFIT New style, convenient carrying case outfit, large all-wool samples, all supplies necessary to start at once—furnished **FREE. WRITE AT ONCE.**

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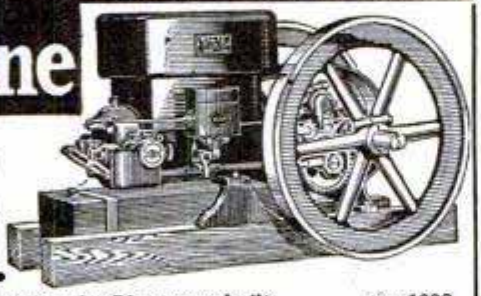
1928 MODEL WITTE Engine



50 New Features 2 to 30 H.P.

Here is the greatest engine I have ever built. . . . . my 1928 model Witte. . . . . the result of 58 years' engine building experience. Let me tell you about this Master Power Plant . . . . . about the 50 new features and how, because of selling direct from factory, I can now make lower prices that are the sensation of the engine world. Forget your previous ideas of engines. My 1928 model will out-perform anything you have ever seen. Operates efficiently on cheaper fuels. . . . . "trigger-quick" in starting even in zero weather. . . . . simple and sturdy. . . . . lifetime guarantee backed by the Million Dollar Witte Factory. Also log and tree saw outfits. . . . . 3 in 1 saw rigs and pump outfits. Easy payments. Be the first in your community to own a 1928 Model Witte. Write me today for all details, prices, etc. ED. H. WITTE, President.

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QUIT TOBACCO OR SNUFF RUINING YOUR HEALTH WASTING YOUR MONEY

Harmless treatment quickly overcomes craving for cigars, cigarettes, pipe, chewing or snuff. Sent on trial. Costs $1.50 if it cures, nothing if it fails. Used by over 500,000 people. Superba Co. N-82 Baltimore, Md.

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A BEAUTIFUL FINISH
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FRANK SCOBIE, 43-S, SLEEPY EYE, MINN.

Boils 50 Gallons In Less Than Hour

No Other Compares With This

Improved Oil Burner

Use Ordinary Kerosene or Coal Oil

[Burns Outdoors as Well as Indoors]

THE most remarkable Kerosene Burner ever built. Boils down apple cider, maple syrup, molasses, etc., in half the ordinary time. Ideal burner for dairies, butchers, indispensable on the farm.

PRODUCES TERRIFIC HEAT WITH SILENT BLUE FLAME

NO NOISE SMELL SMOKE SOOT

So efficient it produces twice the amount of heat of City gas at half the cost. So simple anyone can install and operate. Double generator assures continuous operation without shut-downs. Nothing to wear out, starts in a jiffy, will last a life time. Every burner guaranteed fully. Write for special introductory price and free catalog of outdoor utility and kitchen stove oil burners.

HOME MFG. CO., Dept. 1613, 18 E. Kinzie St., CHICAGO

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We Paid $200 to J. D. Martin of Virginia FOR JUST ONE COPPER CENT

"Please accept my thanks for your check for $200.00 in payment for the copper cent I sent you. I appreciate the interest you have given this transaction. It is a pleasure to do business with a firm that handles matters as you do.—JULIAN D. MARTIN, Virginia

Post yourself! It Pays! We paid Mr. Manning New York $2500 for a single silver dollar. Mrs. G. F. Adams, $740 for some old coins. W. F. Wilharm, Pennsylvania, $13,500 for his rare coins. In the last 20 years we have paid hundreds of others handsome premiums.

All Kinds of Old Coins, Medals, Bills and Stamps Wanted

$1.00 to $1,000 paid for certain old cents, nickels, dimes, quarters, etc. Right now we'll pay $50 for 1913 Liberty Head nickels (not Buffalo) $100 for 1894 dimes, "S" Mint. $8.00 for 1853 quarters, no arrows. $10 for 1866 quarters, no motto. $200 each for 1884 and 1885 Silver Trade Dollars. 10 cents each for 1912 "S" Mint nickels, etc.

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There are literally thousands of old coins and bills that we want at once and for which we will pay big cash premiums. Many of these coins are now passing from hand to hand in circulation. Today or tomorrow a valuable coin may come into your possession. *Watch Your Change.* Know what to look for.

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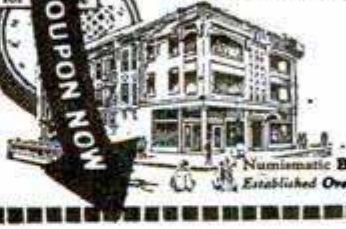

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Please send me your large Illustrated Coin Folder for which I enclose 4 cents.

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Make Your Watches, Clocks, Etc., Visible by Night

The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, emits rays of white light, rendering it perfectly visible in the dark. THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES. Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Small bottle, price 25c. Larger sizes, 50c and $1 postpaid. JOHNSON SMITH & CO. Dept. 818 RACINE, WIS.

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Roll your own and save money. Better and quicker; a cigarette more than half. Use your favorite brand of tobacco. Neat, useful, handy. Pocket size, weighs ½ oz. Made entirely of metal, nickel plated. 25c, 3 for 65c postpaid anywhere.

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Very striking, quaint and uncommon. Silver finish; skull and crossbones design, two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. Only 25c ppd.

Exploding Cigarettes

JUST LIKE ORDINARY CIGARETTES. BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud BANG! A great mirth provoker yet entirely harmless. Price 25c box.

NOVELTY BADGES

Kissing Permit 10c *Garter Inspector 10c*

Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. 10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

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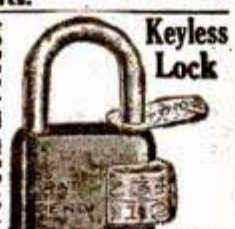
GREAT CURIOSITY Smallest Bible in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for $1.35, 100 for $7.50. Also obtainable in Leather Binding, with gold edges. Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass for use with Midget Bible, 15c.

These clever locks cannot be opened unless you know the combination. No key necessary. For your locker, bicycle, tool chest, mail box, thousands of uses. Shackle and tumblers nickel plated. Weighs trifle over one ounce. Small yet strong. Secret and full instructions with each lock. Price 25c or 3 for 65c postpaid.



STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.

Wonderful X-Ray Tube

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones o your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A mystery that no one has been able to satisfactorily explain. Price 10c, 3 for 25c, 1 dozen 75c, Johnson Smith & Co.

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A great book for boys. It gives plain, practical instructions for making all manner of toys, machines and other articles, amusing and useful. Tells how to make a Steam Engine, a Photographic Camera, a Windmill, Microscope, Electrical Machine, Galvanic Battery, Electric Telegraph, Electrotyping Apparatus, Telephone, Kaleidoscope, Magic Lantern, Aeolian Harp; how to make Boats of all kinds, Kites, Balloons, Paper Toys, Masks, Card Racks, Wagons, Carts, Toy Houses, Bows and Arrows, Pop Guns, Slings, Fishing Tackle, Rabbit and Bird Traps, etc. 200 illustrations. PRICE 25c POSTPAID.

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Post Paid 25c

The Magic Flute, or Humanatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice, will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is as charming as it is surprising.

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Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner. Price per box, 10c postpaid, 3 for 25c

JOHNSON SMITH & CO.

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Protection against Burglars, Tramps, & Dogs

Special Offer
1 Blank Cartridge Pistol
100 Blank Cartridges
1 550-page Novelty Catalog
ONLY $1.50
The Lot
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Well made and effective, modelled on latest type of Revolver; appearance alone is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard .22 Cal. Blank Cartridge—obtainable everywhere. Special cash with order offer: 1 Superior quality Blank Cartridge Pistol, 100 Blank Cartridges, and our new 550 page De Luxe Catalog of latest novelties; all for ONLY $1.50. Shipped by Express only. Cannot go by parcel post. Extra Blank Cartridges 50c per 100. Special Holster (Cowboy Type) for pistol 50c. No C.O.D. shipments

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Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

THE VENTRILO

a little instrument, fits in the mouth out of sight, used with, above for Bird Calls, etc. Anyone can use it.

Never Fails. A 16 page course on ventriloquism, the Ventrilo, ALL FOR 10 CENTS

PISTOL, OPERA AND FIELD GLASS

9 In One

It is made in the shape of and looks like a regular Automatic Pistol. No one is likely to stop and ask you whether it is real or not. Thus it is likely to prove itself very handy in an emergency. On pressing the trigger it opens up as shown in the illustration at the right, revealing nine most useful articles—Opera and Field Glass, Telescope, Mirror, Magnifying Glass and Burning Lens, Reading Glass, Sun Dial, Sun Compass, etc. In the handle of the revolver there is a place for various pocket necessaries, such as First Aid Articles, Buttons, Pins, etc. The Pistol is of sheet metal, blued finish, that can be carried comfortably in pocket. PRICE $1.00 postpaid.

Watch Charm Pistol

$1.75

Exact reproduction of a real pistol; actually fires REAL BLANK CARTRIDGES of miniature size. Illustration 1 x actual size. 1¼ inches long, with ring at end for attaching to watch chain. Loads like a regular pistol. Pull the trigger and it goes off with a loud bang. Pistol is break open type; illustration shows position for loading. Made entirely of high grade steel, nickel plated, octagon barrel, handsomely engraved handles, complete in box with cleaning rod. PRICE $1.75. Also furnished with pearl handles, $2.50. BLANK CARTRIDGES, 50c per box of 25. JOHNSON SMITH & Co., Dept 818, RACINE, WIS.

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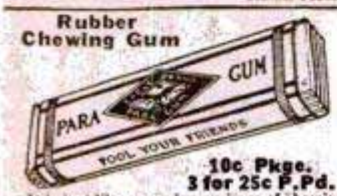

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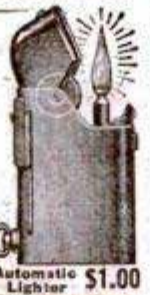

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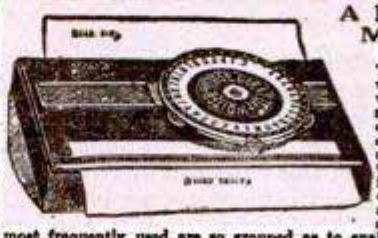

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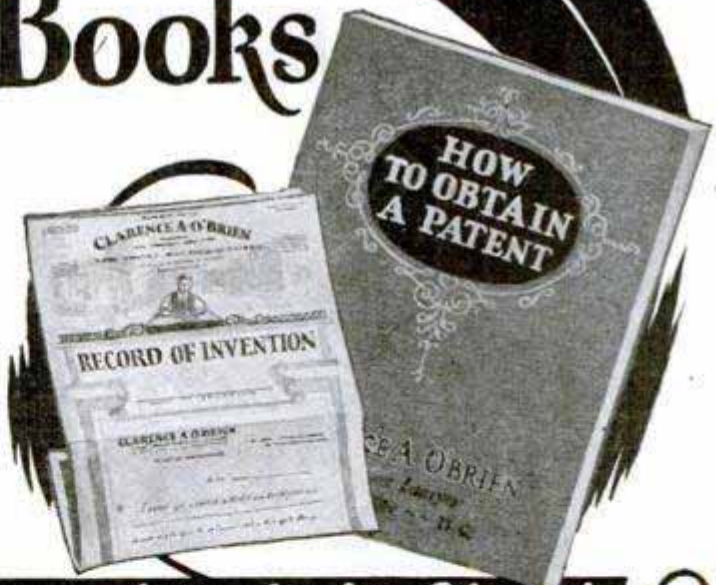

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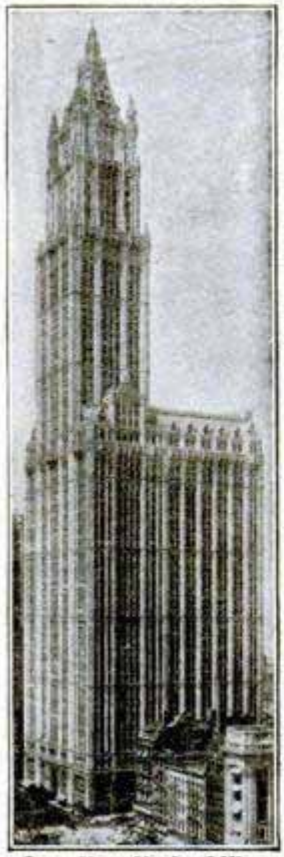

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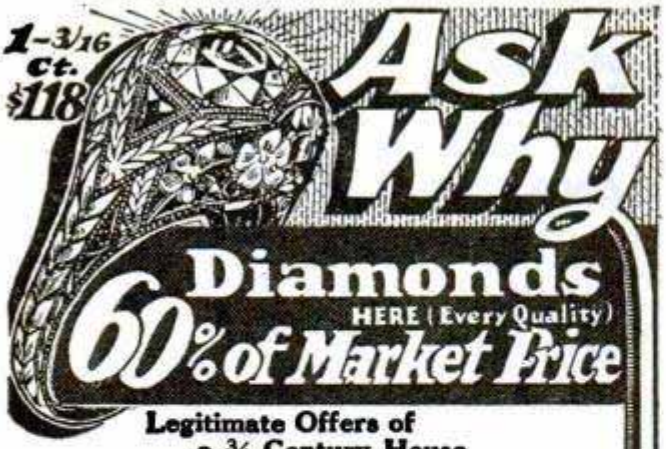

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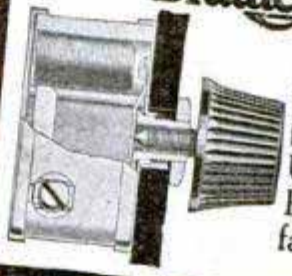

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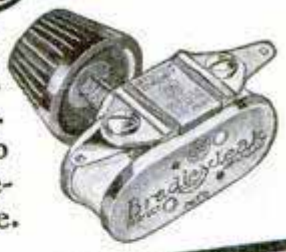

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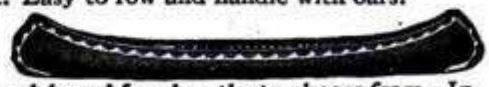

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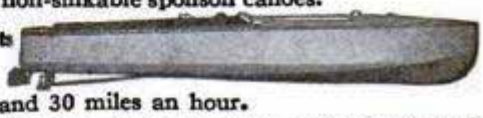

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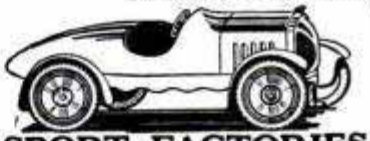

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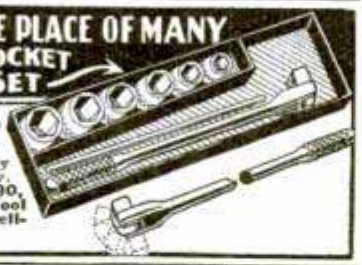

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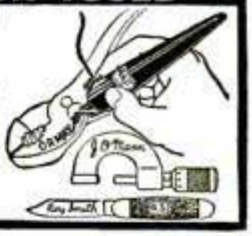

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WE WILL TRUST YOU
Pay As Low As $2.00 per Week
Hendersons, Harley-Davidsons, Indians
Slightly used and rebuilt. Hundreds to select from.
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Simply state: (1) how long at address, (2) age, (3) married or single, (4) name and address of employer, (5) nature of work, (6) how long in employ.

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Earns $60 a Week—Ralph Smith, Chicago, says: "Played 20 minutes at wedding. Received $20." L. E. Hallmann, Reading, Pa., writes: "Made $300 in 5 weeks, spare time. Had never played instrument before."

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Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.

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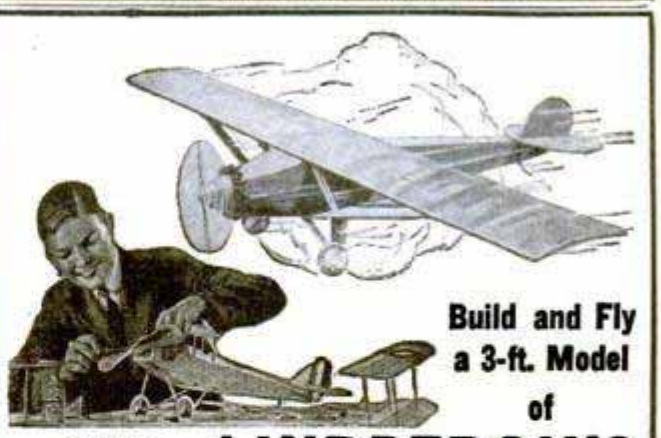

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This IDEAL New York-Paris Monoplane is a perfect copy, 3-ft. size, of the machine in which Lindbergh crossed the Atlantic Ocean. Any bright boy can build this model: The IDEAL Construction Outfit contains everything needed: all parts, fittings, materials and supplies, including careful instructions, plans and diagrams. The model is wonderful; has many features of the original and is guaranteed to fly. **$7.50**

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New Discovery "No-Frost" Offers $15 a Day PROFIT!

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C. Vaughn, Ohio, cleared $125 in one week and says he has more money and friends than ever before. Men and women everywhere are making amazing profits with No-Frost and my 350 other fast-selling products. H. Heintjes, N. J., cleared $30 in 1 day. Mrs. K. R. Roof, S. C., made $50 the first week in spare time. Mrs. B. L. Hodges, N. Y., averages $18 to $20 a day—day in and day out. H. C. Hanson jumped his pay from $25 a week to $75 a week—*and he works only part time.* You can make these big profits too.

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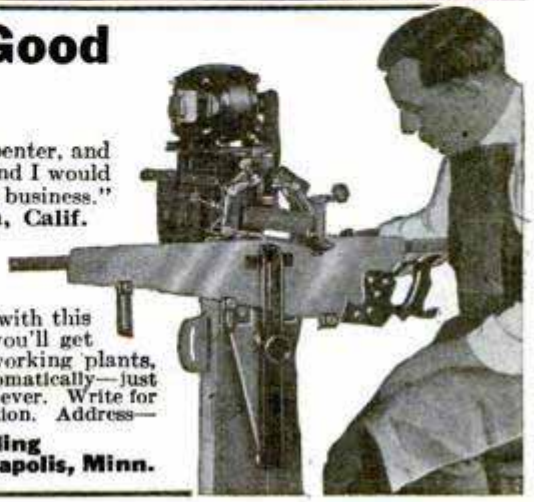
S. C. Moller, Long Beach, Calif.



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New SUPERPHONIC REPRODUCER brings your phonograph up-to-date. Makes your machine produce music of *astonishing naturalness*, **just like latest expensive, new type phonographs.** Brings out lowest bass notes and highest trebles heretofore "lost." The warmth and depth of tone, the tremendous volume will amaze you. **Fills the room like living singers or real orchestra.** Splendid for dancing and home entertainment. Order today on special

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Special! ½ Ct. Blue-White DIAMOND, Man's or Lady's Solid Gold Mounting, $99. CASH ONLY. Cannot Be Duplicated Under $150.

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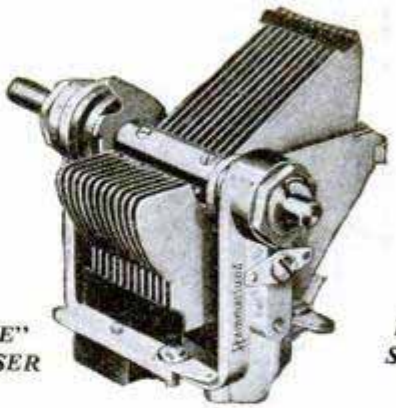

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Also furnish this boat complete at extremely low price.

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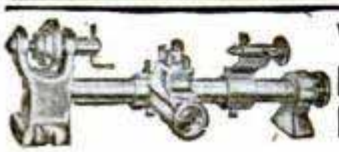

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We employ no agents.

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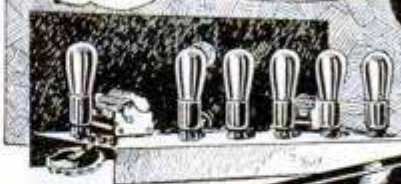

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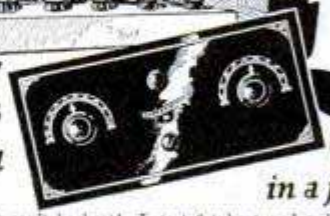

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Send only $1 with order, and your choice comes to you parcel post prepaid on **10 Days Free Trial.** Pay postman only $1 more on delivery; after free trial pay balance in 12 equal monthly payments. Satisfaction guaranteed or your money back
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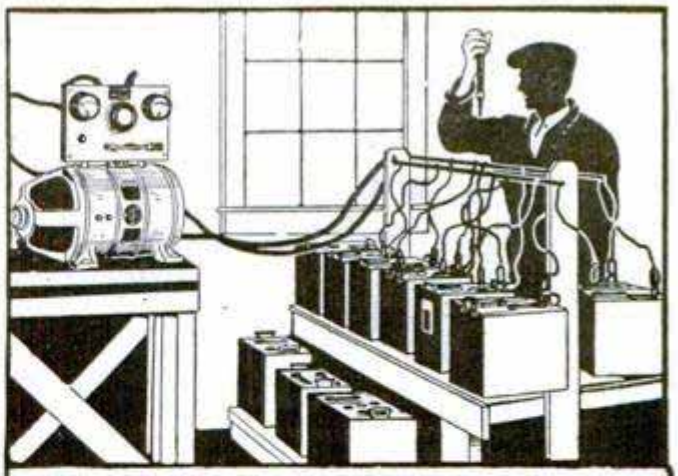

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Free Air Service costs you only $12 monthly for a few months. Fully Automatic day and night service will draw customers to your shop as well as operate your air tools. Check coupon for full details without obligation.

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Successful manufacturers ~ *since 1893* ~

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Hobart Brothers, Box M28, Troy, Ohio.
Send me complete information on the items I've checked—your thirty day trial offer—easy payment terms—information on how HB equipment will increase my earnings.

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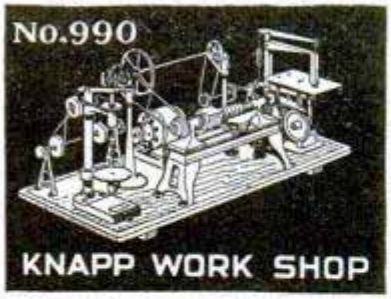
Name..... Address.....

LEARN TO BE A REAL WOOD-WORKER



$27.50
Denver West and Canada—$30.00

NOW you can do it, for now you can buy tools that do real work, at prices you can afford. The above outfit, lathe, jig saw (described below), speed drill that will not only drill wood but bakelite, brass, iron, slate, etc., 1/35th horse-power a. c., d. c. motor, tools, equipment, instruction book. *All for* $27.50—Denver West and Canada, $30.00.

Knapp Jig Saw No. 900
Capacity up to 5/8 in. lumber, also bakelite, celeron, etc. Handy for making radio panels, as well as jig saw and scroll work. Instruction book, wood with design laid out ready for cutting and 3 blades furnished.

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Turns wood up to 5 in. length, 2¾ in. diameter. Tool rest, head rest, tail stock all fully adjustable. Complete with 3 step pulley, 3 high grade cutting tools, and instruction book.

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100.00 weekly PROFIT!

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Model Ship Builders

If you have not started your Flying Cloud model our special construction set will enable you to go to it without any delay. We can supply all Flying Cloud builders with the various deck fittings such as capstans, steering wheels, stanchions, bitts, chocks, and many other items. Large illustrated catalog showing cuts of photos of various ship models, together with prices for construction sets, tools and all fittings sent postpaid upon receipt of ten cents.

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The "Old Town" square-stern is wonderfully sturdy and durable too. Built to carry heavy loads. Made with or without sponsons.

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complete as shown, 7" swing, 24" metal bed, 3 speed cone pulley. Longer bed $1.00 per additional foot.

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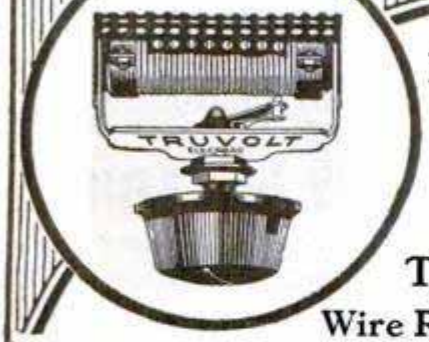

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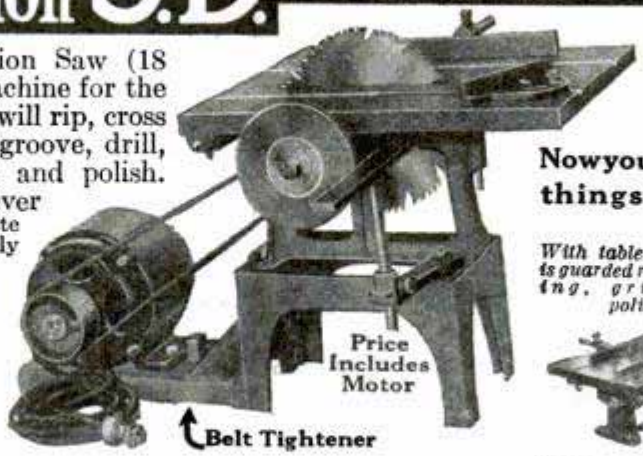

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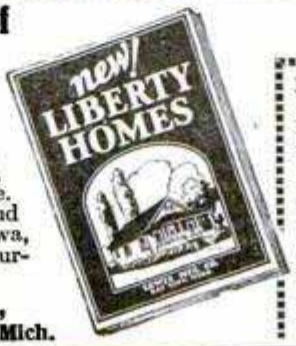

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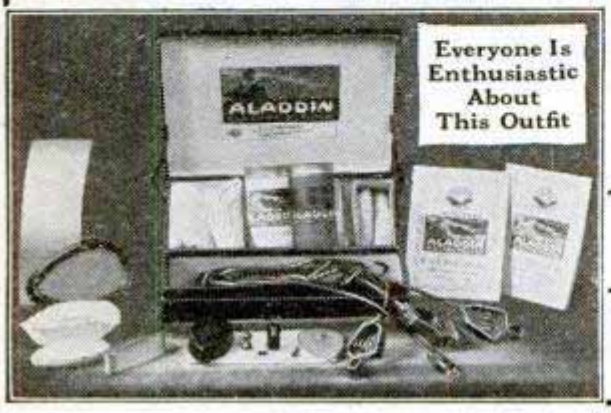

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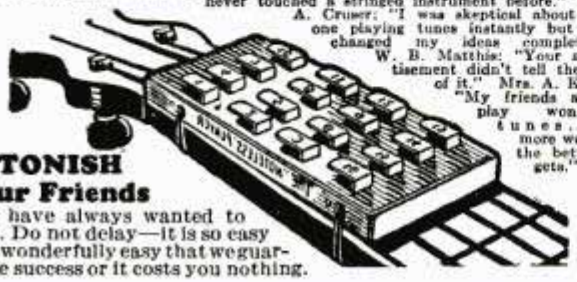

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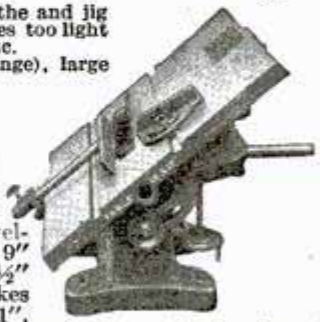
Table 12"x14" tilts 45 degrees. Saws 7" Stock. Uses blades 3/16" to 1/2" wide. Bronze bearings. Ball bearing roller guides.

8" Bench Lathe

Swing 8". 19" center to center. Length over-all 33½"; height 11¼"; width at base 5½"; height of bed 5¾". For wood or light metal turning.

JIG SAW BARGAIN

Ideal for home shop yet practical enough for manufacturer. Capacity 1½" stock. Stroke 1½". Saw to frame 8". Uses blades 1-8" to 3-8" wide. Weight 18 lbs. Price **$11.00**



Universal Handisaw

Has table 15"x 17". Elevates for grooving,—tilts 45° for bevelling. Swings 9" saw, cuts 2½" stock. Insert takes dado head 6"x1", cope heads and 8" sand disc. Also has insert providing opening for 2" Jointer Head. Jointer attachment fits on right of table. Guides always remain parallel to saw regardless of elevation or tilt of table. No other saw of equal cost has this feature.

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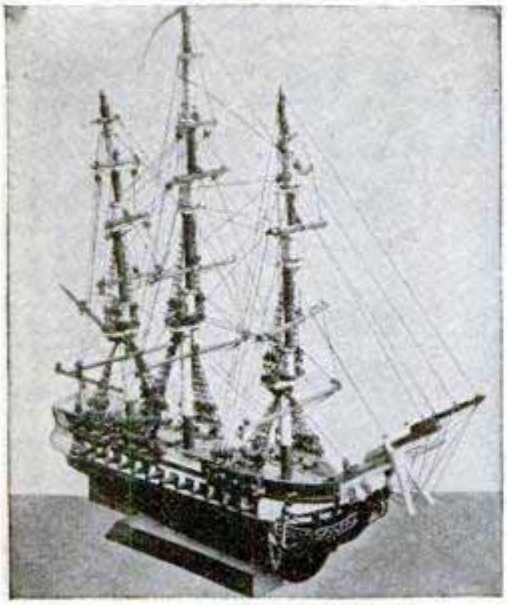
CAN BE PUT TOGETHER BY A SCHOOL BOY IN A FEW HOURS



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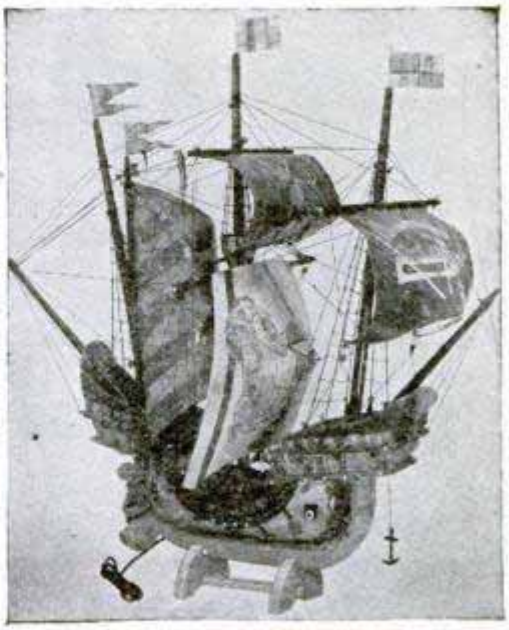
Size:
26" high; 27" long; 8½" wide

A historical ship model, should be in every home. We supply all the parts, cut to fit, and ready to put together. Every part necessary to construct any of the models pictured. A full diagram of numbered parts comes with every kit, with full detailed instructions so that it is impossible to make a mistake. All you need is a small hammer to tap parts in place. Here is a part of the instructions copied from the regular sheet that comes with every kit. Take part No. 57, place it at the front end of No. 56, and down on No. 55. Next take part No. 58 and place it at the rear end of No. 56, and tap in place with a small hammer.

So clear are the instructions that a 15-year-old boy won First Prize in a model contest held by the publishers of Science and Invention Magazine. Hundreds of ship models were entered from all parts of the country. This model was constructed from a regular kit of our parts. The educational and historical value a boy gains in constructing one of these models cannot be measured in dollars and cents. Boys like to build things. They learn while they build.

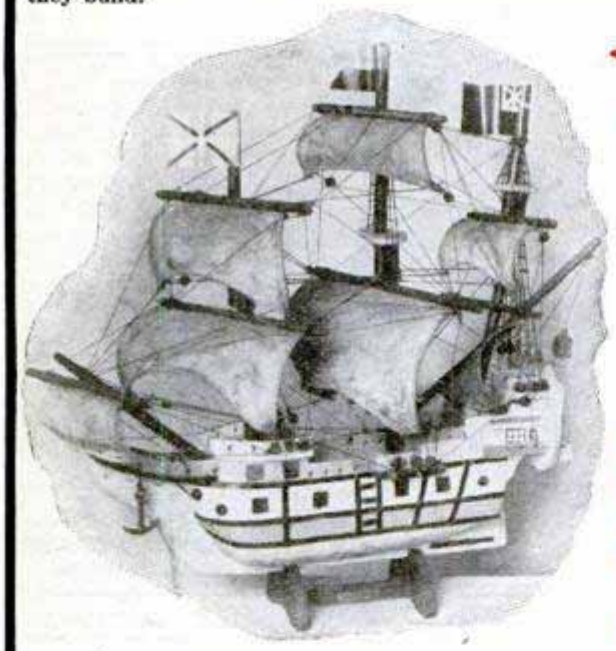


$12.50

LA PINTA
Ship Model Loudspeaker
Size:
26" high; 27" long; 12" wide

←$4.98

MAYFLOWER
Size:
25" high; 10" wide;
26" long



$4.98→

SANTA MARIA
Size:
25" high; 11" wide;
27" long

Sold on money-back guarantee

ALL GOODS SHIPPED SAME DAY ORDER IS RECEIVED

When the model is completed it makes one of the finest home decorations that money can buy, and the adventure of building your own models adds zest to the achievement. You will be proud of your model because you are the builder.

MINIATURE SHIP MODELS, INC.

3818-20-22-24 Baring Street
PHILADELPHIA PENNSYLVANIA

Canadian Branch: 1485 Bleury St., Montreal, Can.

Canadian Prices Slightly Higher. Send all Canadian Orders to Canadian Office.

MINIATURE SHIP MODELS, Inc., Dept. P-5
3818-20-22-24 Baring St., Phila., Pa.

Please send me complete parts, cut to fit and ready to assemble, for the Constitution, $6.98 ☐; Santa Maria, $4.98 ☐; La Pinta, $4.98 ☐; Mayflower, $4.98 ☐. Melody Ships: La Pinta, $12.50 ☐; Santa Maria, $12.50 ☐; Mayflower, $12.50 ☐. I will pay postman purchase price plus postage (a few cents).

Check which model you want shipped.
Catalog only ☐.

PLEASE PRINT NAME AND ADDRESS PLAINLY

Name.....

Street or R. F. D. No.....

City.....

State.....

KNIVES THAT BITE

Here's a knife especially designed and built for carpenters and skilled mechanics, professional or amateur. It belongs in every tool kit.

Remington steel is hardened and tempered by a special process, to produce blades with keen, uniform, and lasting cutting edges. Every blade is hand-honed at the factory. When you buy your Remington every blade will bite, and you can keep a biting edge on Remington blades.

R4223 has a heavy spear blade for general use; a sheepsfoot blade for scribing or coping, and a pen blade for delicate work.

Ask to see this knife at your dealer's. Get your hand around the fine stag handle and test the "feel" of it. Notice the fine finish, brass linings, and German silver mountings. You'll want to own one at once. And if your dealer shouldn't have R4223 in stock, send us his name with $1.50 and we will forward the knife to you promptly.

Remington

ARMS COMPANY, Inc.
Established 1816
25 Broadway, NEW YORK CITY
C 1928 R.A. Co.

ARMS, AMMUNITION, CUTLERY
CASH REGISTERS, SERVICE MACHINES

MAKE YOUR RADIO an ELECTRIC Set *with a* TOWNSEND "B" Power Unit *at a* Cost of Only $6.85

Why pay from $65 to $450 to own an electric set when you can quickly and easily make your own set all electric in this new surprisingly inexpensive way?

Approved by the laboratory tests of Radio News and Popular Radio.

Complete

We show you how. Write for full information.

Townsend Laboratories
713 Townsend St., Dept. 15, Chicago, Ill.

BUILD YOUR OWN CLOCK WITH OUR HELP

Profitable spare time work for the winter. Turn idle hours into welcome dollars by building clocks from our instructions.

We furnish plans, instructions, blue prints, works, dials and all materials at surprising low prices. You make a fine profit building artistic clocks for your friends.

Banjo Clocks, Mantel Clocks,
Beautiful Grandfather Clocks with chimes, complete works as low as $5.00, other styles at all prices.

WRITE FOR OUR CATALOG AND FREE BLUE PRINT PLAN

AMERICAN CHIME CLOCK COMPANY
1670 Ruffner Street, Philadelphia

BUILD YOUR OWN EXPONENTIAL HORN

This marvelous 17 in. x 21 in. cabinet orthophonic horn with a 96 in. air column can be easily built in a short time by any amateur. It is built of soft wood which produces the best tone quality of any known material.

We furnish you with a set of **FULL SIZED PATTERNS** which have been accurately and scientifically worked out according to the exponential principle and from which it is **DECIDEDLY EASY TO BUILD** this latest and most efficient tone producer.

It is most gratifying to build your own horn especially since the results are equal to those of the most elaborate and expensive horns on the market.
Send $2.00 for a set of these full sized patterns and complete instructions.

RADIO PRODUCER CO.
Dept. 6 1244 Jefferson Bldg. Peoria, Ill.

Материал защищенный авторским правом

FACTORY PRICES~SAVE 50%
Choice of beautiful cabinets offered

TRY IT 30 DAYS FREE
BEFORE YOU BUY

ALL METAL SHIELDED CHASSIS

3 Year Guarantee

8 tube one dial MIRACO

TRADE MARK REGISTERED

Only $69.75 Retail List Completely Assembled

MAGNIFICENT TONE~SUPER SELECTIVE~POWERFUL DISTANCE GETTER

All Electric or Battery Set

America's big, old, reliable Radio Corporation (8th successful year) **guarantees** in its big, powerful, latest 6, 7 and 8 tube Miraco sets "the finest, most enjoyable performance obtainable in **high grade** radios." Unless 30 days use in your home fully satisfies you a Miraco is unbeatable at any price for beautiful, clear cathedral tone, razor-edge selectivity, powerful distance reception, easy operation. etc.—**don't buy it! Your verdict final!** Save or make lots of money on sets and equipment — write for testimony of nearby users and **Amazing Special Factory Offer.**

Miracos work equally fine on "AC" electric house current or with batteries. Take your choice. Many thousands of Miraco users — who bought after thorough comparisons — enjoy programs Coast to Coast, Canada to Mexico, loud and clear — with the magnificent cathedral tone quality of costliest sets. Don't confuse Miraco's with cheap, "squawky" radios. Miraco's have finest parts, latest approved shielding, metal chassis, etc.—as used in many $200 sets.

DEAL DIRECT WITH BIG FACTORY

Your Miraco reaches you completely assembled, rigidly tested, fully guaranteed. Easy to connect and operate. **30 days trial free.** 3 year guarantee if you buy. You take no risk, you insure satisfaction, you enjoy **rock-bottom money-saving prices by** dealing direct with one of radio's oldest, most successful builders of fine sets. 8th successful year.

Big Discounts to User-Agents

MIRACO "Powerplus" sets—8 and 7 tube models—have magnificently beautiful, clear cathedral tone quality. Turn one dial for stations everywhere. Ultra-selective. Latest all-metal shielded chassis. Illuminated dial. Fully guaranteed. Try one **free for 30 days!** Big selection of beautiful cabinets.

7 tube one dial METAL SHIELDED CHASSIS $49.75 RETAIL LIST

Dealers Write!

USER-AGENTS! Make big profits showing Miraco to friends. Get Our Special Wholesale Prices!
MID-WEST RADIO CORPORATION, Cincinnati, O.

BEAUTIFULLY ILLUSTRATED CATALOG AND AMAZING SPECIAL OFFER

Free!

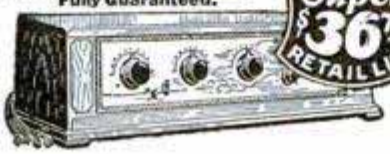
SEND NO MONEY—30 DAYS' TRIAL, Special Wholesale Price Offer to User-Agents, Bank References, testimony of nearby Miraco users —*all the proof you want*—sent with catalog.

mail coupon right now!

Electrify Any Radio with **MIDWEST NO-BATTERY "a c" Light Socket Power Units** Save $'s

"A", "B" and "C" power, direct from light socket, without batteries! Write for Midwest prices and discounts. Units are highest grade—lastingly dependable, quiet in operation, fully guaranteed. Mail coupon!

ANOTHER BIG BARGAIN! Famous powerful big Miraco Super 6, 1928 model—ultra selective! Thousands find it outperforms sets of much higher price. **30 Days' Trial Free. Fully Guaranteed.**



6 tube Super $36.75 RETAIL LIST

MIDWEST RADIO CORP'N
Pioneer Builders of Sets
407-G Miraco Bldg., Cincinnati, Ohio.

THIS COUPON IS NOT AN ORDER

WITHOUT OBLIGATION, send me free literature, AMAZING SPECIAL WHOLESALE PRICE OFFER, testimony of nearby users, etc.
[ ] User [ ] Agent [ ] Dealer

NAME

ADDRESS

These And Other Gifts Given

WE MAKE IT EASIER TO SELL Here's What We Do To Help You

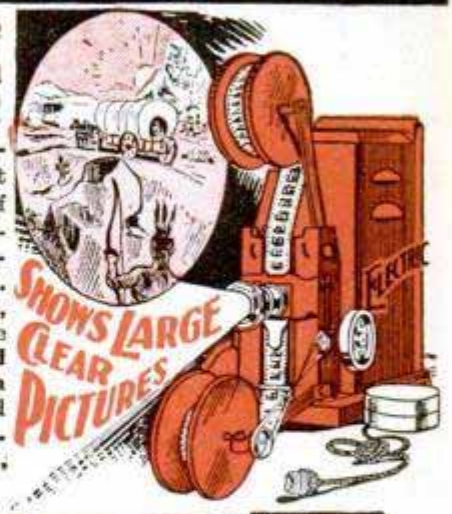
To EACH PERSON You Sell

FREE

A Purse-Size Packet of the Famous MAD CAP Rouge and a Silverware Certificate. Good for 6 Silver plated Teaspoons.

Both FREE with each bottle of our fragrant Perfume, which you sell at 15c a bottle. Remarkable value—that's why our plan is the easiest ever offered. Try it—you can't lose—use the coupon in opposite corner. ACT NOW!

Have Your Own Movie Show!



This is the **Famous Keystone Moviegraph** — best made. Operates on principle of professional models. Shows moving pictures as well as slides. Practice reel of Tom Mix picture furnished. Also 50 slides, bill posters, show tickets, etc. Yours for selling our fragrant perfume at 15c a bottle. **Mad Cap Rouge and Silverware Certificate FREE with each bottle, makes it easy.** Send for 20 bottles and easy double plan for getting this outfit. **Use Coupon.**

BELL PERFUME CO., Dept. P. M. 19, Chicago, Ill.

10-YR. GUARANTEED WRIST WATCHES

For Girls, Boys, Ladies or Men

Both watches are beauties. Non-tarnishable, white satin finish cases, richly engraved. Fitted with **Genuine Jeweled Movements, Guaranteed for 10 years.** Girl's watch is dainty Tonneau shape. Comes with ribbon bracelet and metal clasp. Boy's watch shows time in the dark. Has leather strap and buckle.

Either watch is given for selling our fragrant perfume at 15c a bottle. **Famous Mad Cap Rouge and Silverware Certificate FREE with each bottle,** makes it easy. Send for 20 bottles and easy double plan. Send no money —just the coupon at bottom. Please write plainly. **BELL PERFUME CO., Dept. P. M. 5, Chicago, Ill.**

1000 SHOT REPEATER AIR RIFLE BOTH GIVEN FOR SELLING

This famous King Lever Action, powerful Repeater rifle or large size, Genuine Eastman, Roll Film Camera, yours for selling only 20 bottles of our fragrant perfume at 15c each. **Famous Mad Cap Rouge and Silverware Certificate FREE with each bottle, makes it easy.** Send no money—just the coupon at bottom.

BELL PERFUME CO., Dept. P. M. 18, Chicago, Ill.

THIS WATCH SHOWS THE TIME IN THE DARK

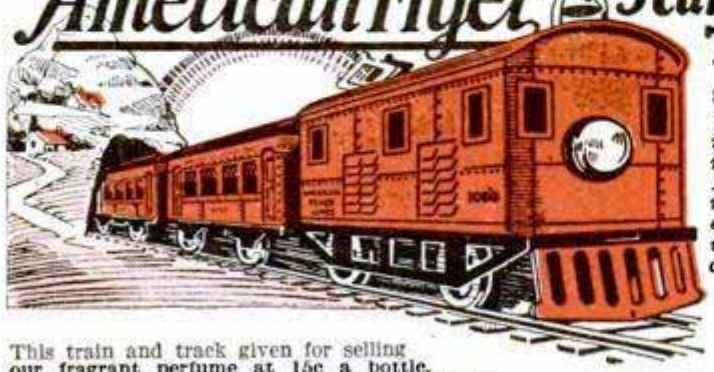
22 Cal. HAMILTON RIFLE

SEND NO MONEY

Here is a real comrade for you. A rifle that's a dandy. Has bronze barrel—will not rust nor pit. Has automatic shell ejector, front and rear sights, beautiful walnut finish stock, trigger guard, etc. Shoots 22-Calibre cartridges. Yours for selling our fragrant perfume at 15c a bottle. **Famous Mad Cap Rouge and Silverware Certificate FREE with each bottle, makes it easy.** Send for 20 bottles and easy double plan. We trust you. Just send the coupon at bottom.

BELL PERFUME CO., Dept. P. M. 34, Chicago, Ill.

American Flyer 3 Car Electric TRAIN GIVEN



8 Section Track Included

When it comes to Electric Trains none can compare with that made by the American Flyer Mfg. Co. It's in a class by itself. And this is an example of the values we give for selling our perfume.

This train and track given for selling our fragrant perfume at 15c a bottle. **Famous Mad Cap Rouge and Silverware Certificate FREE with each bottle, makes it easy.** Send for 20 bottles and easy double plan for getting this outfit. We trust you —just send the coupon. Please write plainly.

BELL PERFUME CO., Dept. P. M. 28, Chicago, Ill.

WE TRUST YOU—JUST MAIL COUPON

BELL PERFUME CO., Dept. P. M., Chicago, Ill.

Send me postpaid 20 bottles of your fragrant Perfume, also 20 purse packets of MAD CAP ROUGE AND SILVERWARE CERTIFICATES. I will sell the perfume at 15c a bottle and give the Rouge and Silverware Certificate FREE with each bottle. Will remit in 30 days and select gift from your catalog, sent with Perfume.

Name..... (Please print name plainly)

R. F. D., Box or Street No.....

City.....

State.....

Материал защищенный авторским правом

This illustration shows the main building of the McCleary Sanitarium and Clinic at Excelsior Springs, Missouri—the largest institution in the world devoted to the treatment of piles and other rectal troubles.
(Only curable cases are accepted.)

A Serious Affliction Cured Without Surgery

THE old theory that piles can be cured only by surgery has been wholly disproved. This treacherous affliction which slowly but surely undermines the health of its victims can be cured—totally and successfully—without the dangers of a surgical operation.

Patients From All Parts of United States and Canada

For 27 years, Dr. A. S. McCleary and his associates have made an exhaustive study of rectal diseases. During that time, more than 13,000 patients from all parts of the United States, Canada and foreign countries have been successfully cured. Scores of these had been given up as incurable and many others were chronic cases of long standing.

Absolute Relief or No Pay

No matter how long you have been troubled—

No matter how distressing your case may be—

No matter how many treatments you have had without avail, if your case has not been neglected so long as to be incurable, we can promise you absolute relief or no pay.

If you or any of your relatives or friends are interested, we will gladly mail you our free book, "Piles Cured Without Surgery." This book fully describes the McCleary methods of diagnosis and treatment of all rectal troubles, and tells you exactly what is offered here at a very nominal cost.

The McCLEARY CLINIC and SANITARIUM

254 Elms Boulevard
EXCELSIOR SPRINGS, MO.

McCleary Clinic and Sanitarium
254 Elms Blvd., Excelsior Springs, Mo.

Please send me book fully describing the McCleary Method of Treating Piles Without Surgery.

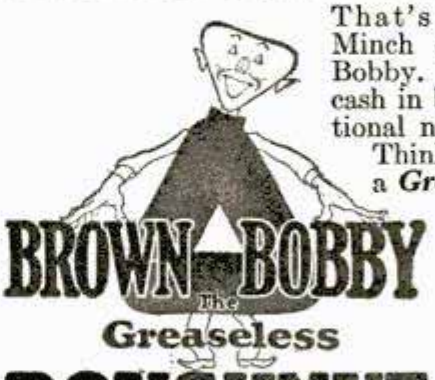
Name.....

Street Address.....

Town or City.....**State**.....

"I Made $1,000 a Month

from the new Food Sensation *Greaseless* Doughnuts"



That's what Thomas Minch did with Brown Bobby. You, too, can cash in big on this sensational new food product. Think of it! Actually a ***Greaseless*** **Doughnut!**

Archie Gwinn, of Minnesota, wrote: "Sold 50 dozen the first day. Going good." H. Glosto, Chicago, says: "Selling over 300 dozen a day. Thanks for your co-operation." Owen of Detroit operates 24 hours a day to produce 250 dozen daily, and cannot fill his orders fast enough. So it goes everywhere. Big profits are waiting. Investigate!

Big Profits for YOU!

Millions of greasy doughnuts are sold daily, hard as they are to digest. What a mammoth market for Brown Bobby! Cooked without a trace of grease to a golden brown—crisped to a feathery lightness—Brown Bobby is positively the food sensation of the age. No one thought a doughnut could be made without grease. But WE did it. And **YOU** can get in on the first easy profits.

Simple, Easy and Sure

Get this! With one simple, inexpensive, electrically operated machine, you can turn out a full dozen Brown Bobbys every 3 minutes—cost, less than 1c each. No baking skill required. Just add water to our patented "Mix." No bother. No boiling grease. No odor. A child can do it. Big money for women making Brown Bobbys at home. Tremendous opportunities in every town for a thriving business on a surprisingly small investment. Wherever there are hungry people, Brown Bobby is a sure hit. In lunch rooms, drug stores, wherever food is sold Brown Bobby offers a chance for amazing profits. Special openings for Brown Bobby Specialty Doughnut Shops in every town.

Write Quick! Be the first in your locality to get the first easy profits. Whatever your present line-up, let us present you a plan that will be feasible and full of opportunity for a steady, paying business. Just mail the coupon! Get the facts now. Profits are waiting.

FOOD DISPLAY MACHINE CORP.

350 W. Huron St., Dept. 13-52, Chicago, Ill.

Food Display Machine Corp., Dept. 13-52
350 W. Huron St., Chicago, Ill.

Gentlemen: Please send me the plan by which I can cash in on Brown Bobby, the Greaseless Doughnut. It is understood that this obligates me in no way whatever.

Name.....

Street.....

City.....State.....

A word to American Boys

from one of the country's largest manufacturers

WE'VE tried to give American boys a good honest shoe for all kinds of sports, and everyday wear—Keds. Expert shoe craftsmen make them from materials which represent honest value.

And today we really believe that dollar for dollar Keds are the best canvas rubber-soled shoes you can buy.

Frankly, we want as many of you fellows as we can get to be users of Keds. But we want fair play, too. If you like some other brand and ask for it in the store—we don't want you to go out with a pair of Keds unless you know it and are convinced that you have found better value.

But if you like Keds and ask for Keds we want to see that you really get Keds.

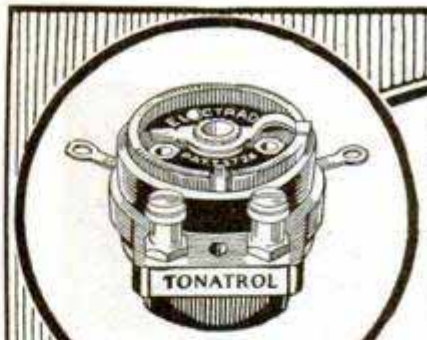
The best way to make sure that the shoes you are buying are genuine Keds is to look for the name "Keds" on the shoes. If it isn't there—then the shoes are not Keds. That name is your guarantee of getting what we have tried to make the best canvas rubber-soled shoes to be had.

Write for our free booklet containing all kinds of information on games, sports, camping, vacation suggestions and dozens of other interesting subjects. Dept. 1870, 1790 Broadway, New York City.

United States Rubber Company

The sure way to Keds Value

They are not Keds *unless the name Keds is on the shoe*



Exclusively Licensed by Technidyne Corporation Under U. S. Patent No. 1593658, July 27, 1926.

Superior—By Far!

TONATROL

A True Tone and Volume Control

Volume through its complete range—from a whisper to full power—is at your finger tips with Tonatrol. An improvement for any receiver. Very simple to install.

Tonatrol Standard Volume Control $1.50. Tonatrol Type W.S. (with filament switch attached) $2.00.

Write for free installation circular.

Dept. 66-D, 175 Varick Street, New York, N. Y.

ELECTRAD Inc.

Now You Can Own a Lathe ONLY $13.50

10 Days' Trial

At last a complete wood turning lathe at a price you can afford. Just what you and your boy have been wanting. Now you can make many practical articles at a big saving.

Will Last a Lifetime

We back the "Partridge" with an unlimited Guarantee. Sturdy, durable. Has 6" diameter. Larger sizes on request.

Send No Money. Just say: "Send me your lathe complete." You can then pay $13.50 on delivery, plus express charges (weight 21 lbs.). Your money back in 10 days if you're not delighted. You take no risk.

E. O. PARTRIDGE, A2041 W. Lake, CHICAGO

Here It Is Boys! Look It Over

R. O. Gosden of Michigan made $321.05 in 9 days—sold 5 machines in 2½ hours.

THE EUREKA ADVERTISER
(The Merchant's Friend)

Automatically prints the merchants' "ADS" on his wrapping paper in one or two colors. Costs only what it costs to have "AD" printed on twenty rolls of paper. Flint of New York sold four machines in two hours. You collect and keep your commission. We deliver. Every merchant a prospect. Many buy five or more machines—one for each paper rack they use.

SALESMANAGER, Dept. A1, 1201 Cortland Street, Chicago, Illinois

$106 A WEEK *Showing Clothes!*

No man needs to be a "master salesman" to earn amazing big money showing LaSalle Gold Seal Clothes. Think of giving men genuine LaSalle Gold Seal SUIT AND TOPCOAT, or TWO SUITS for only $27.95! You're giving them an amazing bargain. No wonder men everywhere buy eagerly.

EXTRA MONEY DAILY!

You actually earn $6 on every sale! LaSalle Gold Seal clothes are fine quality, excellent workmanship. You can guarantee perfect satisfaction, and a price that instantly wins every man. You don't need experience. Earn big money at the start! We furnish you with an extra large FREE OUTFIT, big, sales getting swatches, and full instructions. Don't wait. Seize this opportunity today. Be a LaSalle Gold Seal big money man!

BIG *FREE* OUTFIT

LaSalle Gold Seal Clothes

Dept. A, 527 Broadway New York City

Save ½! 30 days FREE TRIAL Satisfy yourself

Completely Shielded

Genuine Licensed Circuits

Manufactured under license grants of

Radio Corporation of America

and affiliated companies

The set that's the talk of the radio trade. Acknowledged as the greatest radio value. A Con-Rad six tube completely shielded chassis with single illuminated dial control. Absolutely the latest in radio receivers. Manufacture under license grants, insures highest quality; chassis incorporates all the features found in most efficient receivers. Complete shielding insures freedom from all foreign noises. Very selective and sensitive. Brings in long distance stations with wonderful tone and volume. Both table and console cabinets come in the newest styles and most beautiful woods. All are well constructed, carefully finished and will add beauty to any room.

CON-RAD
SINGLE DIAL CONTROL
6

6 TUBE SETS
Completely assembled
$34.75 to $66.66
RETAIL PRICES

Prove It Yourself—30 Day Free Trial

Quality and price are what you are most interested in. A Con-Rad receiver is ready to undergo any test you demand. Try it in your home on our 30 day Free Trial offer and be satisfied. If you are not, return the receiver to us and your money will be refunded. You must be satisfied!

MAIL COUPON NOW!

Write today for complete information. Our catalog gives full details of the Con-Rad line of 1928 and our liberal 30 day Free Trial offer.

BIG DISCOUNTS to AGENTS & DEALERS

Demonstration set sent on Free Trial. Make big money working full or spare time taking orders for Con-Rad Radios. Write today for special prices and proposition.

CONSUMERS RADIO CO.
Dept. 161
4721 Lincoln Ave., Chicago, Ill.

Consumers Radio Co.,
4721 Lincoln Ave., Dept. 161
Chicago, Ill.

Gentlemen:
Please send me full particulars and catalog of the Con-Rad Line of 1928 and your 30 day Free Trial offer. No obligation.

Name.....

Street.....

City.....State.....

MADE $1200.00 NET PROFIT IN 90 DAYS

You Can Do It Too FREE Book Tells How-

SEND FOR THIS BOOK

Here's Your Chance!

The big opportunity you've always wanted—to make extra money, BIG MONEY, in your spare time, at home. W. T. Moore, Twin Falls, Idaho, made a net profit of $1200 in 90 days. You can do it too—turn every spare hour into $4 to $6 profit with the

IDEAL LAWN MOWER SHARPENER

You, too, can make yourself independent, build a permanent, honorable, big-paying business with this "Ideal" Grinder—a wonderfully simple machine that sharpens all makes of lawn mowers perfectly, scientifically, without taking the mowers apart. Just pick up the mower, set it in the "Ideal," make a few simple adjustments and proceed to sharpen. In 15 minutes the mower is ready for the lawn, and you have made $1.50 to $2.00—depending on the charge you fix.

OVER 15000 IN USE

Man, It's Amazing How Easy it is to make big money with the "Ideal." Anyone can do it! H. J. Nulick, El Dorado, Kans., turned his grinder business over to his 14 year old son.

Hundreds of Dull Mowers in your locality are waiting to be sharpened. No town too small. R. S. Newcomer, Vinton, Ia., writes: "People come for miles around and other towns to get their mowers ground." Your customers stay with you, too. The "Ideal" sharpens mowers to razor edge. Owners are delighted; tell their friends; your business grows by leaps and bounds.

$2100 Last Season
W. F. Kendt, Buffalo, writes: "I sharpened 994 lawn mowers last season and the receipts were nearly $2100—not bad for a side line."

You Make Money Right Away Geo. E. Kearney, Stillwater, Minn., writes: "We set the machine up 2 weeks ago Friday; since that time have sharpened 102 mowers." That's close to $200 in Kearney's pocket for 2 weeks' work!

This Is Your Chance, Man! Make Us Prove It
Our FREE BOOK, "Let George Say It," contains proof of what we say. Send today for it.

The Fate-Root-Heath Co.
818-844 Bell Street
Plymouth, Ohio

SIGN AND MAIL THIS TODAY

THE FATE-ROOT-HEATH CO.
818-844 Bell St.,
Plymouth, Ohio.

You'll have to prove that I can make big money with the "Ideal" Grinder. Send me your FREE BOOK.

Name.....

Address.....

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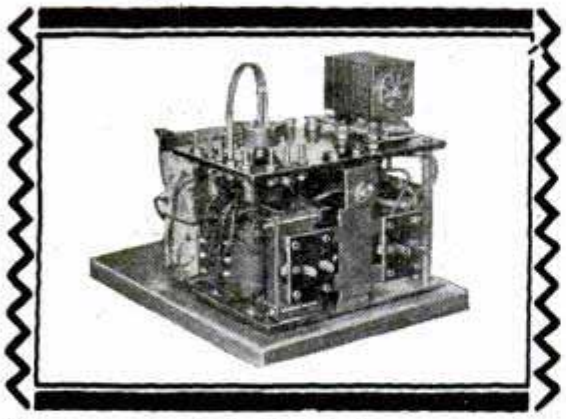
Magic Silence



The Tinkle of Profits is the only noise in this Absolutely Dry

"A" Power Unit for Set Builders

Knapp "A" Power Kit

[Our money making proposition for Set Builders is making the Knapp "A" Power Unit. Big Profits and Perfect Satisfaction Guaranteed.]

The absolutely dry Knapp Condensers having the amazing capacity of 1500 microfarads and condensed in a space of 2x2x8 inches is the basis of this startling new "A" power unit.

Absolute Quiet

Make this test—place a pair of head phones directly across the output of the Knapp "A" Power Unit—the magic silence of the perfect "A" Power Unit is at once apparent.

Perfect Rectification

The Knapp "A" Power uses a solid full wave rectifier. Its life is practically unlimited—in a year and a half we have never had to replace one. Will operate 8 tubes, one of which may be a power tube.

No tubes—no electrolytic action—no acids, alkalis, no liquid—no moving parts—a perfect rectifier.

Assembled in a half hour

The Knapp "A" Power Kit can be assembled in from half an hour to an hour. There are only 8 soldered joints. Every part down to the last screw is supplied. Any one, even if they do not know a thing about radio can assemble it without difficulty.

Special Proposition to Set Builders

Our president, David W. Knapp, has authorized us to make the set-builders of America the most amazing profit-making proposition ever offered. Mr. Knapp's money-making plan is open for a limited time only. Write **today** for complete information on the finest "A" Power Unit ever designed and the most liberal discounts ever offered set builders.

Knapp Electric Corporation
320 Fox Island Road Port Chester, N. Y.

5 advantages of the Knapp "A" Power Kit

1. Absolutely dry — no acids, liquids, or tubes.
2. Perfect Rectification.
3. Magic Silence — no hum audible even with ear phones.
4. Easy to assemble—½ hour enough.
5. Quick and Easy Profits with the Knapp Special plan for Set Builders.

Oh Boy! See All!

Big 3½ Ft. Telescope

Solar Eye Piece

Lend wings to your eyes! People and objects miles away seem close. Wonder telescope brings new pleasures to home, farm, camp, travel, sport. Study the mysterious Sun spots; see Moon and Stars as never before. See people on the beach, on the mountains, etc.

FREE Yes, absolutely free! A handsome leatherette Carrying case and Shoulder Strap. Also Solar Eye Piece to view the sun—a special feature, found only on expensive instruments.

5 Sections 8 Power Lenses

Brass bound; measures 12 in. closed; powerful achromatic lenses protected by dust caps.

Thousands Pleased

P. Brush wrote: "Watched submarines three miles off coast." Ed. Foster: "Tell time on clock five miles away." C. Scribner: "See lighthouse 18 miles away." Mrs. Yarbrough: "Could tell color of aeroplane four miles away." S. M. Gearhart: "Can see men working seven miles away."

Sports

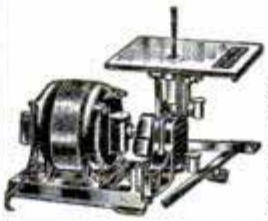
Touring

Beach Views

SEND NO MONEY

On delivery of Telescope, free Case, Strap and Eye Piece pay Postman only $1.85, plus postage (2 complete outfits $3.50). Satisfaction guaranteed or money refunded. Send today, entertain your friends! Be first to have one.

FERRY & CO., Dept. 1773, Chicago, U. S. A.



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Modern Methods demand better equipment. Here it is. The International Motor Saw does all sawing jobs: cross cuts, rips, bevels, miters, and scroll work.

Write for full description. **Dept. S. The International Stamping Co., 400 N. Leavitt St., Chicago, Ill.**

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500 worthy MEN and WOMEN

to stop working long **hours for poor pay** and begin retailing Rawleigh's Good Health Products to your neighbors. Easy to sell monthly $250-$500 worth of flavors, spices, food products, toilet preparations, medicines, soaps, veterinary and poultry products. Over 150 different daily necessities used by yourself and your friends. No selling experience needed—we show you just how to succeed. Low prices. Good values. Complete service. For free particulars

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Cut the Family Barber Bills

Fits Any Light Socket

Belle City

Home Electric Hair Clippers

Made by old, experienced manufacturers of barber clippers. Plugs into your light socket and anyone can use it successfully for trimming, bobbing, shortening bangs, clipping neck, in fact saves barbering bills for the whole family. Equally practical for removing superfluous hair under arms, on forearms or legs. Cuts clean as a razor. Does not clog, pull, nor cut the skin.

Saves Its Cost

The Home Electric Hair Clipper is a tried and proven appliance — now used in thousands of homes. Does work equal to the best barber clippers. Rigidly guaranteed. Takes the place of razors and dipilatories for women.

Will operate on direct or Alternating current

Can be supplied for the following voltages—Regular house current, 110 and 120 volt, A C or D C—32 volt Delco Light System and storage battery power, 6 volts.

Ten Days' FREE TRIAL

The Home Electric must sell itself to you. If your hardware or electrical dealer can't supply you, send today for interesting booklet or order from this ad. Pay postman **$8.75.** Use it for 10 days, then if it doesn't prove a wonder, a money saver, return it in good order and your money will be refunded. State whether your current is 110, 220 or 32 volt.

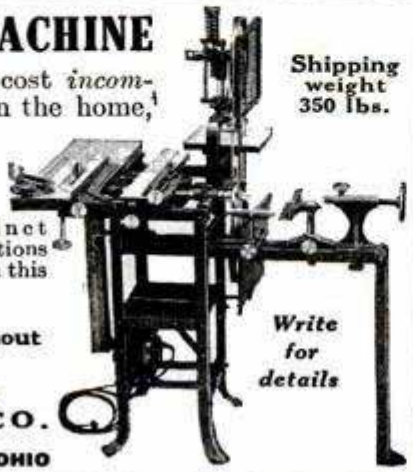
Belle City Appliance Co.
1022—12th St. Racine, Wis.

Dealers and Sales Representatives Wanted

A new practical and profitable line. Sells summer and winter to men and women. *Write for plan.*

A REAL MACHINE

at a reasonable cost *incomparable* for use in the home, shop or light woodworking factory. 8" circular saw, will rip 2¼" material. 20 distinct woodworking operations can be performed on this machine.



Shipping weight 350 lbs.

Sold With or Without Motor

Write for details

KORNAU MACHINE CO.
Station A,
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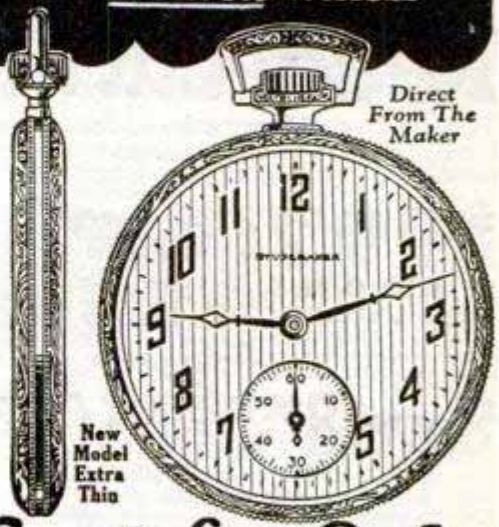
21 JEWEL ~ *Extra Thin*

STUDEBAKER

The *Insured* Watch



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Lowest prices ever named on similar quality. You save 30% to 50%. Ladies' Bracelet Watches, Men's Strap Watches. Diamonds and Jewelry also sold on easy payments.

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A copy of our beautiful, new, six color catalog will be sent Free to anyone sending the coupon below. Shows 80 magnificent, new Art Beauty cases and dials. Latest designs in yellow gold, green gold and white gold effects. Exquisite thin models. Masterpieces of the watchmaker's craft.

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Directed by the Studebaker Family—three-quarters of a century of fair dealing
WATCHES DIAMONDS JEWELRY
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☐ Please send me Jewelry Catalog free.

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You can buy all the materials for a complete home direct from the ALADDIN mills and make big savings on the lumber, millwork, hardware and labor.

$997

7 ROOMS

All Materials Readi-Cut

2 floor plans. Living room, dining room, kitchen, three bedrooms, bath, closets.

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4 floor plans. Living room, dining room, kitchen, two bedrooms. Any handy man can erect an Aladdin house.

PRICES INCLUDE

Lumber cut-to-fit; highest grade knotless, interior woodwork; beautiful, clear siding; flooring; windows; doors; glass; paints; hardware; nails; lath; shingles or roofing, together with complete instructions and drawings that make it easy for anyone familiar with tools to erect an Aladdin home.

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4 plans. Living room, dining room, kitchen, three bedrooms or two bedrooms and bath.

Prompt Delivery—We Pay Freight

Complete shipment of all materials can be made within a few days after order is received. We guarantee safe arrival of complete materials and PAY FREIGHT. Aladdin's 22 years' success is proof that you can do as thousands of other home-builders do every year—SAVE money, time and annoyance by building an Aladdin home.

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Three excellent plans. Can be built with or without fireplace.

FREE CATALOG

Write today for your Free copy of the handsomely illustrated Aladdin Catalog. It is just off the press and presents many new types of modern homes, garages and summer cottages — 33 styles with 99 different floor plans for you to choose from! Address nearest mill TODAY, asking for catalog No. 335.

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Complete instructions, with photographs and drawings, for making the most attractive styles of ornamental iron work.

Andirons	Grilles	Rosettes
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Bulbs	Drawer Pulls	Door Plates
Window Fasteners	Door Keeps	Spiral Decorations
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Thomas F. Googerty, the author, is one of the best-known makers of this type of metal work. The illustrations are all of work made by the author. Almost every page has one or more illustrations either made from drawings or from photographs. Anyone interested in this type of work can soon develop his ability so that he can make these articles for his own use or for sale. There is a growing demand for articles of this type.

Send No Money Simply write a postal for this book of instructions, asking that "Hand-Forging" be sent C.O.D. When postman hands you the book, pay him the postal charges and $2.00.

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861 discoveries by practical farmers, telling how to make, repair or improve the various devices and machines used about a farm or garden. 683 illustrations. "The Most Remarkable Book Ever Published for Farmers," says one authority. ***Send No Money.*** When the postman delivers the book to you, hand him $1 plus the few cents postage.

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Blueprints for the most popular sets described in Popular Mechanics Magazine can be obtained for a charge just sufficient to cover the cost of production and mailing. The sets for which blueprints are available are:

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New Browning-Drake Receiver	Sept. 1927	25c
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Address the RADIO DEPT.

Popular Mechanics Magazine

200 E. Ontario St., CHICAGO

Back numbers of the magazines describing the construction of the sets can be obtained from our Circulation Department, price 25 cents each.

Makes Old Ford a Tractor

Pulls 16 inch Plow, Discs, Seeds, Cultivates, Runs Belt Machinery

Its massive traction wheels give firm footing on spongy ground. Special Crawford fan keepsengine cool —always.

Tractor No. S4 pulling a 16-inch plow. Notice that our latest improved equipment no longer requires sawing off rear end of Ford frame.

See how this SHAW-tractorized Model "T" Ford rolls merrily along turning up the soil. Equipped with SHAW Tractor Parts, any old Model "T" Ford makes an economical, serviceable tractor.

New Profits for Garage Men!

The new Model "A" Ford will throw thousands of old Model "T" Fords out of use. You can build up a profitable business rebuilding them into sturdy tractors like this one pictured above. Sell them to the farmers and market gardeners in your community. Mail coupon at once for full particulars!

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We want agents for all parts of the United States. Many good territories now open. Mail coupon for our generous offer!

Does All Farm Work!

It's easy and inexpensive to make your old Model "T" Ford into a powerful, dependable tractor with SHAW Tractor Equipment. The SHAW-tractorized Ford will do all your plowing, harrowing, discing, cultivating, seeding, and run belt machinery.

Thorough tests have proved that it does all farm work just as well as a big expensive tractor.

It handles a 16-inch plow nicely. Cultivates 15 to 20 acres a day. Pulls a seeder. Easily pulls a 7-ft. disc harrow. Handles five 31-inch lawn mowers. Pulls a heavy steel road drag with two persons riding the drag.

Never Idle—Pays for Itself

Your SHAW-tractorized Ford need never be idle. When not in the field, keep it busy running feed grinders, concrete mixers, lathes, wood saws, pumps, etc. Will do more for you for the small amount of money invested than any other tractor on the market.

By saving time, labor and money it pays for itself in one short season. Runs 2 hours on a gallon of gas. Costs but a few cents per hour to operate.

Easy to Attach

You don't have to be a mechanic to attach SHAW Tractor Equipment. Anyone can easily do the job in a short time with a monkey wrench and screwdriver. We furnish complete, easy-to-follow instructions. Explain how to attach the drive wheels, gears, etc. So simple, you can't possibly go wrong.

If you do not wish to attach equipment yourself, you can buy a SHAW-tractorized Ford complete, ready to run, at low cost from a local dealer in your territory.

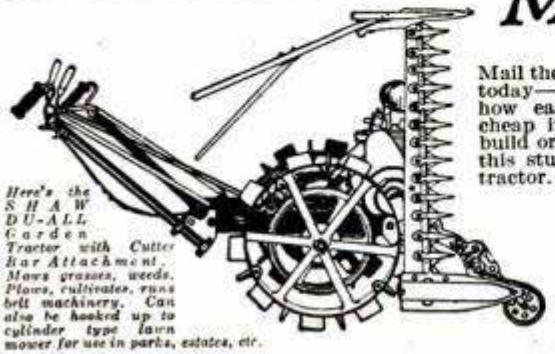
Special Low Price Now!

Right now you can get SHAW Tractor Equipment at a Special Low Price—even lower than our regular factory price. This offer is for a short time only—until we cut down our present stock. So take advantage. Act quick. Write at once for detailed descriptive literature and Special Low Price Offer. Mail coupon—today!

SHAW MANUFACTURING COMPANY

4502 Center Street **GALESBURG, KANSAS**

Mail Coupon NOW



Here's the SHAW DU-ALL Garden Tractor with Cutter Bar Attachment. Mows grasses, weeds. Plows, cultivates, runs belt machinery. Can also be hooked up to cylinder type lawn mower for use in parks, estates, etc.

Mail the coupon today—find out how easy and cheap it is to build or buy this sturdy tractor.

SHAW MFG. CO., 4502 Center St., Galesburg, Kans.
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☐ Literature on "Making my Ford a Tractor."

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Generous offer to:

☐ Garage Men ☐ Agents

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For MEN ONLY!

In exchange for some of your high ambitions, we offer you a thriving business of your own—*easy*, pleasant work bringing you profits of

$25 to $75 a Day!

If you've got the will to succeed, here is something that will quickly enable you to realize your fondest dreams.

No training—no experience necessary. Wherever you are, whatever you are doing—You can be a CLARKE FLOOR-CRAFTSMAN! It is a highly respected, highly paid profession. Very little capital needed—absolutely no over-head expense—all you need is the WILL to succeed!

A high opportunity for **real men** only!

Always plenty of work the whole year around. You stay in your own town—deal with its best people.

It's pleasant work with a wonderful machine that does better work than any other machine of its kind has ever done before—a machine electrically driven, which does the work of six men working by hand. A light-weight machine that is almost as easy to operate as a vacuum cleaner!

You get the credit and the pay for the wonderful work the Clarke Vacuum Portable Sander does. From the start, profits of $25 a day are yours. Soon you can have a business of your own, and be clearing up to $75 a day! All you need is the Clarke Vacuum Portable Sander and the desire to get ahead!

Realize on that WILL to succeed—find out at once how CLARKE FLOOR-CRAFTSMANSHIP will get you where you want to be. It's money out of your pocket if you don't mail the coupon! Write today!

CLARKE SANDING MACHINE CO.,
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Gentlemen:—Please send me the actual facts on how I can be a CLARKE FLOOR-CRAFTSMAN. No obligation to me.

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For Eleven Years, Originators and Manufacturers of Portable Vacuum Sanders.

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A Healthful, Profitable Winter Pastime!

LEARN to play a band instrument. There's more fun in it than you can shake a stick at. And it's healthful pleasure, too. A band instrument will do more to develop your lung capacity and chest expansion than any trick exercise or machine.

Profit, Too

The demand for good band musicians is greater than the supply. The salaries paid are unusually high. You can hold to your present job and make considerable money outside of regular working hours.

Must Learn on a Good Instrument

Don't let anybody tell you that you can learn to play on a low-grade instrument. Buy the best—a King Band Instrument. You'll be surprised how easily and quickly you'll learn.

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A King Band Instrument is built like a fine, jewelled watch, and tested even more thoroughly. Yet a King costs no more than a low-grade instrument.

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We ship direct from mill all framing lumber and sheathing sawed, cut and fitted, complete blue-prints and full instructions.

Easy to build as swinging a hammer! Every part numbered according to plan. All the figuring, measuring, roof-pitches, angles, already done for you. No cutting of heavy floor-joists, rafters, or timbers. Even the doors are mortised for locks.

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By buying direct from mill, you get benefit of big volume and economy operation —lowest wholesale prices!

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If you actually want to make more money—more than you have ever made in your life—you can do it. Write to us and we'll show you how to do it with the

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No special training nor large capital is necessary. We show you how it's done in a couple of hours. Floor surfacing has grown to be a big, important business. Men become specialists at it and earn big money. It's a clean, healthy, inside job, not dependent on weather conditions. There are no dull seasons—always plenty of work. **Every new floor** has to be surfaced. Thousands of old marred and scarred floors need re-surfacing. **Think what that means! It's your opportunity.** The "American Universal" floor surfacing machine is the only one that does re-surfacing that experts endorse 100%. It takes the place of six hand scrapers. Works by electricity. Simple, easy and quick. Write today for full particulars, reports of users making big money and our special five-day free trial plan. Clip and sign the coupon now. Go out and put it in the mail box now. Decide now that you will get into something that will pay you the bigger money that other men are getting.

The American Floor Surfacing Machine Co.
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Toledo, Ohio

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Please send me at once, full particulars about floor surfacing as a profitable business the "American Universal Way."

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WE want custom builders in every community to become our Factory Representatives on SUPER HILODYNE, the modern and independent radio circuit. YOU can make big profits building and selling this marvelous set. Parts, units and chassis are now ready for distribution. Be the first in your community to investigate our money-making plan.

Write TODAY to Dept. PM-228.

Algonquin Electric Co.
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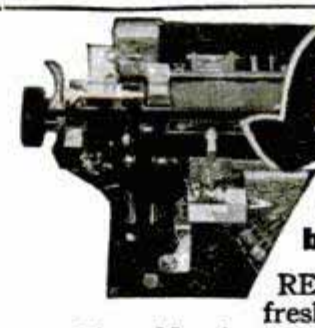

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RESTORO keeps ribbon freshly inked for perfect writing. No changing ribbon for year or more. SAVES enough in cost of ribbons to pay for typewriter. EZ terms—10-day trial. 5-year Guarantee. $10.00 RESTORO *free* for limited time.

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Earns $79 a week Giving Away FREE TIES!

with the finest suit or topcoat ever made for the amazing low price of $16.95, and $14.45. They are genuine Danbury Clothes! More than 3,000 men, from coast to coast, are earning amazing incomes with this wonderful clothing offer.

NO EXPERIENCE NEEDED

No matter where you live or what you do now, you can double your income just showing these garments. We don't claim for one minute they're $75 garments, but we guarantee they're the greatest clothing bargain ever offered! Only tremendous production makes it possible. Men buy eagerly. You can earn handsome commissions in advance. We furnish you FREE outfit. We give your customers 4 beautiful ties with every double order—sold in stores at $1 each—FREE, and you make from $7.00 to $9.00 on each sale. Don't wait. Double your earnings the very first week. For full and Free information write this very minute to

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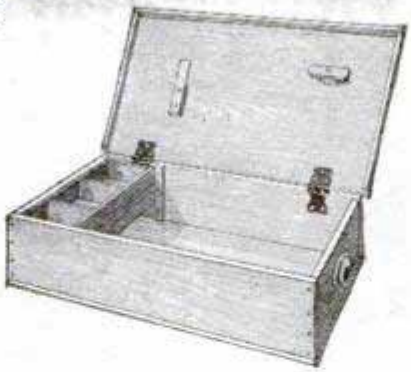
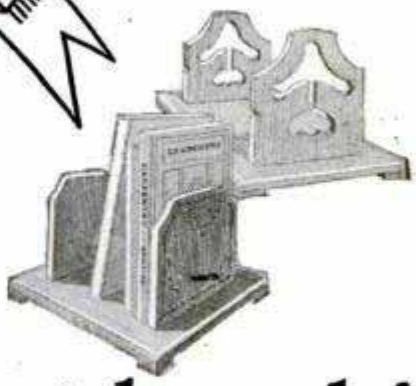
193 Greene St. Dept. A New York City

PLAN NO. 14d

MAKE THEM YOURSELF

PLAN NO. 1d





PLAN NO. 71d

Now anyone can work with tools!

Use these plans — 10c each

HERE is a way to get articles like the above at little cost. And it's real fun to make them with your own hands and with your own tools.

There are 25 different Stanley Plans. The list is shown in the centre of this page. Each plan tells you just how to make the object—every step—how to select and cut the wood, how to assemble the job, how to sandpaper, paint and finish it.

Here is the complete list of the Stanley Plans No.

1d—Book Rack
2d—Candle Stick
3d—Pipe Rack
4d—Flower Box
5d—Table Lamp
6d—Toy Automobile
7d—Sconce
8d—Dinner Gong
9d—Bird Houses
10d—Dog House
11d—Book Stand
12d—Smoking Cabinet
13d—Kitchen Cabinet
14d—Sewing Cabinet
15d—Cedar Chest
16d—End Table
17d—Tea Wagon
18d—Model Sailboat
19d—Flat Bottom Rowboat
20d—Combination Kitchen Seat and Step Ladder.
21d—Garden Seat
22d—Garden Trellises
70d—Small Tool Chest
71d—Large Tool Chest
72d—Work Bench

To do your best work you need good tools—of course! Practically every carpenter uses Stanley Tools. Manual Training classes, too. Stanley makes the most complete line.

Buy your Stanley Plans from your hardware dealer. If he cannot supply you write to us. Send 10c for each plan and ask for a free catalog of Stanley Tools. Address The Stanley Works, New Britain, Connecticut.

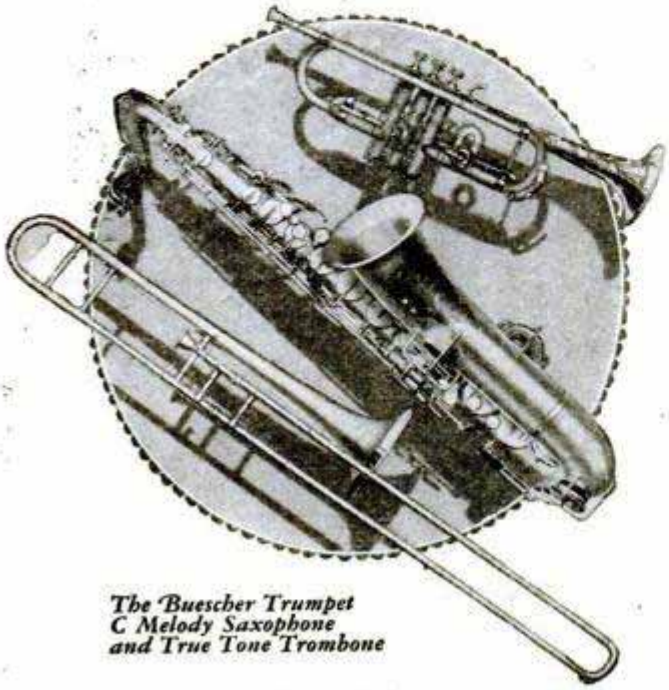
The best tools are the cheapest to use

Ask your hardware dealer

STANLEY TOOLS

The choice of most carpenters

Take One Home on *Six Days' Trial*



The Buescher Trumpet
C Melody Saxophone
and True Tone Trombone

What is your favorite wind instrument? Saxophone, Trumpet, Trombone, Cornet? You can have any Buescher you choose for six days' trial in your own home.

Show Dad and Mother what *you* can do in just those few days.

You can soon Master a Buescher

Every boy wants to play some musical instrument. Because the boy who can play has more fun and many opportunities that boys who cannot play, do not have. You can soon master a Buescher. Many play scales the first hour, easy tunes the first week.

—if you can pass this test

But you must be able to pass this test. [1] Whistle a tune, any tune. [2] Keep step with the band or other march music. If you can do these things you can learn to play in no time.

Nothing like a Buescher

But remember! Only with a Buescher Instrument is rapid progress assured. Because Buescher Instruments are easy to finger and easy to blow. That is why the great professionals play Bueschers. Finest instruments made.

Sign the coupon below and mail it today for complete information as to how you can get one of these wonderful instruments for six days' trial. This will not obligate you in any way. Besides, we will send you also a beautiful catalog showing all the models of your favorite instrument. Mail coupon now. Mention instrument you like best.

BUESCHER BAND INSTRUMENT CO.
Everything in Band and Orchestra Instruments
2269 Buescher Block Elkhart, Indiana

BUESCHER BAND INSTRUMENT CO. 378
2269 Buescher Block, Elkhart, Ind.

Gentlemen: Without obligating me in any way please send me your literature. Mention instrument interested in.

Age ?.....Name Instrument.....

Name.....

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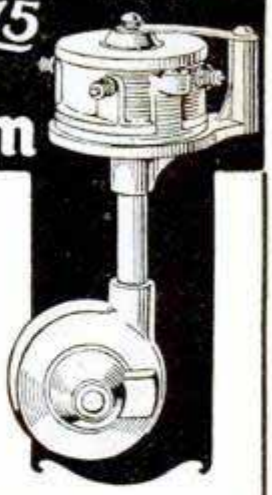
Send only $3.33 for this $8.75 Milwaukee Timing System



Give your FORD more power with this famous $8.75 Milwaukee Timing System. Adds to the life of the motor—and reduces vibration. Only one moving part, no friction. Has genuine Tungsten contact points. Outlasts several ordinary timers.

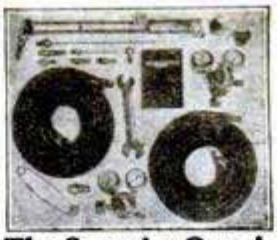
Effective Ignition Lock

Open cover and remove rotor and motor cannot be started.

Magneto or battery operated—uses four standard FORD coils.

Send $3.33, mentioning model of car or tractor and we will forward this wonderful Milwaukee Timing System prepaid by return mail.

D. Matras & Sons Co. Inc.
930 Walnut Street
Milwaukee, Wis.



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GET SUPERIOR'S PRICES BEFORE YOU BUY. WELDING OUTFITS for—Welding—Cutting—Lead Burning—Carbon Burning—Soldering—Brazing—Radiator work. Outfits $18.00 to $69.20.

The Superior Oxy-Acetylene Mach. Co. HAMILTON, OHIO P. O. Box 285

38,000 CANDLEPOWER —NO GLARE!

Wonderful New Invention Solves Headlight Problem

Trippe Reflector just discovered by Chicago man solves the auto headlamp problem. This wonderful device gives a terrific light of 38,000 candlepower absolutely without glare. Slips right into headlamp over old reflector, easily installed. Comes complete with bulbs and sells for only a few dollars. Agents wanted everywhere. Wire or write TODAY!

AGENTS—You Want This Proposition Write Today!

AERIAL ELECTRIC CO.
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The "MAGIC WHEEL" Lighter

MEN, here's a real lighter that you will be proud to own. Absolutely dependable—lights instantly every time—never fails. The "MAGIC WHEEL" is a mechanical masterpiece. Highly polished silver finish. Ideal "All-year round" gift.

SEND NO MONEY!—only name. Deposit $1.97 plus postage on delivery. Satisfaction fully guaranteed.

UNITED PREMIUM CO.
321 B'way Dept. 102 NEW YORK

FREE!

"MEN! Here's the 'dope' you've been looking for-

HOW TO GET INTO THE RADIO BUSINESS"

J.E.S.

EARN BIG MONEY in Work That is Almost Romance

If you're earning a **penny less than $50 a week,** clip coupon now for FREE BOOK! New 64-page book, profusely illustrated, tells all about the Radio Profession, thousands of opportunities **—in work that is almost romance!** YOU can learn quickly and easily at home, through our tested, improved methods, to take advantage of these great opportunities! Why go along at $25 or $35 or $45 a week, when you can pleasantly and in a comparatively short time learn to be capable of holding the big pay jobs?

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Don't envy the other fellow who's pulling down the big cash! Our proven home-study training methods make it possible for you, too, to get ready for a better job, to earn enough money so you can enjoy all the good things of life. One of the most valuable books ever written on Radio tells how—interesting facts about this great field, and how we can prepare you, quickly and easily in your spare time at home, to step into a big-pay Radio job. You can do what others have done through our training. GET THIS NEW FREE BOOK. SEND COUPON TODAY.

J. E. SMITH, President

National Radio Institute
Dept. 2-HH, WASHINGTON, D. C.

Big Receiving Outfit Included in Course

Instruments shown here and others—sent to our students free of extra cost. **Clip coupon now**—find out all about this big unequalled offer while you still have time to take advantage of it. Our training is intensely practical—these instruments help you learn to do the practical work. Receiving sets, from simplest kind to thousand-mile receiver. Many other big features.

J. E. SMITH
President

My Radio Training Is the Famous "Course That Pays for Itself"

Spare time earnings are easy in Radio when you know it the way we teach you. Increase your income almost from the start of your course thru practical knowledge we give you. We show you how to hold the job, then our Employment Department helps you get one. Free Book "Rich Rewards in Radio" tells how. Howard B. Luce, of Friedens, Pa., made $320 in 7 weeks during his spare time. D. H. Suitt of Newport, Ark., writes, "While taking the course I earned in spare time work approximately $900." Earl Wright of Omaha, reports making $400 in a short time while taking his course—working at Radio in his spare time only! Sylvester Senso, 207 Elm Street, Kaukauna, Wis., made $500.

And when your training is completed you're ready to step into a real big Radio Job like C. C. Gielow, Chief Operator of the Great Lakes Radio Telegraph Company; E. W. Novy, Chief Operator of Station WRNY; Edward Stanko, Chief Operator of Station WGR; and hundreds of other N. R. I. trained men. The National Radio Institute, originators of Radio Home-Study Training, established 1914, today offers you the same opportunity these men had under a contract that pledges you full satisfaction or money refunded on completing our training. It's your big chance to get into Radio!—mail coupon for FREE Book and proof!

Coupon Brings FREE Book Mail It NOW!

Radio Needs Trained Men

SEND THIS COUPON TODAY

National Radio Institute, Dept. 2-HH, Washington, D. C.

Dear Mr. Smith:
Without obligating me in any way, send me your big FREE BOOK, "Rich Rewards in Radio," and all information about your practical home-study, Radio Course.

Name.....Age.....

Address.....

Town.....State.....

Материал защищенный авторским правом

To make a smooth, spotless, non-wearing, easily cleaned garage floor

A DIRTY garage floor is as bad an eyesore as a dirty car.

Ordinary concrete is porous. Oil sinks in and makes ugly spots, and appearance is also marred by the dust that grinds loose at dry places.

By mixing Smooth-On No. 7 into the top layer when laying the floor, you get a permanently smooth, dense, iron-hard, non-abrading, impervious surface that sheds water, absorbs no oil, is easy to keep spotless and stays spick and span. Adding the Smooth-On No. 7 to the concrete involves no special effort—merely spreading over while the top surface is soft, rubbing in with a float and finishing in the ordinary way with a steel trowel.

The extra cost for the Smooth-On for a single-car garage is about $9.50 and any one familiar with the working of concrete can do a perfect job.

Write for FREE BOOK

USE Smooth-On No. 7 also for waterproofing old, damp and leaky cellar walls and floors, boiler pits, stopping leakage from ponds, cisterns, troughs, etc. Can be applied easily like a paint and when so used is the only practical waterproofing material that can be applied **from the inside** and to **wet or dry** surface. On old concrete, and masonry surfaces, about 25 lb. of Smooth-On No. 7 are required for each 100 sq. ft. of surface covered, and no experience is necessary.

Get Smooth-On No. 7 in 5-lb. cans or 25, 50 or 100-lb. kegs. If your dealer will not supply you, write to us direct.

Do it with SMOOTH-ON

SMOOTH-ON MFG. CO., Dept. 37,
574 Communipaw Ave., Jersey City, N. J.

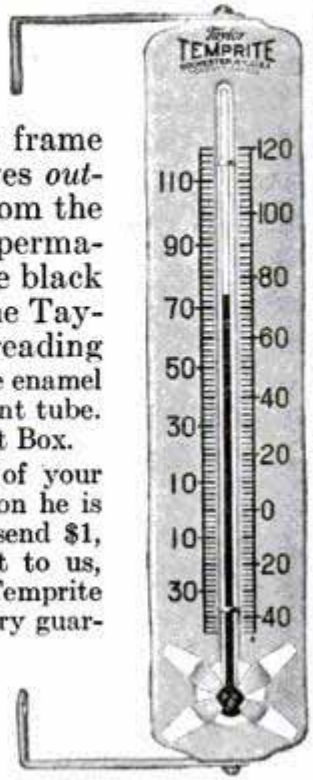
Please send literature on Smooth-On No. 7.

Name.....

2-28 Address.....

Taylor TEMPRITE

Window Thermometer



Attaches to window frame on the *outside*. Gives *outside* temperatures from the *inside*. Brilliant permacolor filling and large black graduations make the Taylor Temprite easy reading at long distances. White enamel on steel back. Lens front tube. Packed in attractive Gift Box.

Get Taylor Temprites of your dealer. If for any reason he is unable to supply you, send $1, plus 10c postage, direct to us, and we will mail you a Temprite immediately, safe delivery guaranteed.

Price $1.00

Taylor Instrument Companies
ROCHESTER, N. Y., U. S. A.
Canadian Plant: Tycos Building, Toronto
Manufacturing Distributors in Great Britain: Short & Mason, Ltd., London

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AMAZING NEW **ADDING PENCIL**

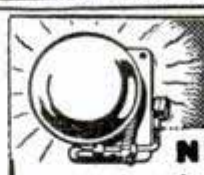
TOTAL SHOWS HERE

ADDS MULTIPLIES SUBTRACTS DIVIDES

A real adding machine and pencil combined. A beautiful, valuable, lifelong companion that is ever ready to do your writing and adding.

MONEY MAKER Turn spare time into money just showing it to friends. Get sample and literature now

HOUK ADDING PENCIL CO., Dept. 38 St. Louis, Mo.



Protects Life and Home

NEVER-FAIL ALARM

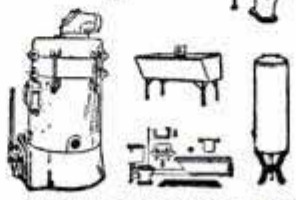
warns away prowler and sneak-thief from home, garage, barn or chicken house. Patented, guaranteed signal bell rings 2 minutes when doors or windows are tampered with. NOT ELECTRIC. No upkeep expense. Quickly installed. Mounts in small space. Handsomely finished in oxidized copper or nickel. Door or window style in either finish. **$1.50** Post Paid

AGENTS MAKE BIG PROFITS DEMONSTRATING

THE AKRON ALARM CO., Dept. 14, Kenmore, O.

Stanley Plumbing Supply Co. Inc.

SAVE 1/2



We sell everything in plumbing, heating, hardware, paint, roofing and millwork supplies. Due to large-quantity buying, we are able to offer you Grade A merchandise at enormous savings. Satisfied customers in every State. Send for our elaborate catalog—over 95 pages of surprising bargains.

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400 N. 12th Street, PHILADELPHIA, PA.

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REWARD

Find the "One" House That

Is Different From the Others—It's GIVEN

There are 14 six-room houses pictured here. To be sure they all look alike, but examine them closely. Thirteen of them are exactly alike, but one, and only one, is different. It isn't as easy as it looks. See if you can find the different one. It is going to be given away without cost.

4

These Clues Will Help You At first glance all the pictures look alike, but on closer examination you will see that one, and only one, differs in some way from all the others. The difference may be in the fence, steps or even shutters. If you can find the one house that is different from all the others write me TODAY QUICK. You may become the owner of this house without one cent of cost to you.

5

6

Built Anywhere in U. S.

The one house that is different from all the others is going to be given away without cost It makes no difference where you live. The house can be built anywhere in the U. S., and if you do not own a lot I will even arrange to buy a lot on which to build the house. A beautiful and comfortable six-room house may be yours if you can find the different house. Certainly you have longed for the day to come when you could own your own home—this is your golden opportunity. Act QUICK.

7

You Cannot Lose Positively every one taking advantage of this opportunity is rewarded. Find the one house that is different from all the others and rush your name and address to me TODAY. A postal card will do, just say, "House No. —is different from all the others. Without any obligation please tell me how I can get this fine six-room house without one cent of cost to me."

LEE MORGAN, Pres.
Box 444 Batavia, Illinois

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14

"What would I do if I lost my job?"

SUPPOSE your employer notified you tomorrow that he didn't need you any longer? Have you any idea where you could get another position?

Don't have this spectre of unemployment hanging over your head forever. Train yourself to do some one thing so well that your services will be in demand. Employers don't discharge such men. They *promote* them!

Decide today that you are going to get the specialized training you must have if you are ever going to get—*and keep*—a real job at a real salary. It is easy if you really try.

Right at home, in the odds and ends of spare time that now go to waste, you can prepare for the position you want in the work you like best. For the International Correspondence Schools will train you just as they are training thousands of other men—no matter where you live—no matter what your circumstances or your needs.

At least find out how, by marking and mailing the coupon printed below. There's no cost or obligation, and it takes only a moment of your time, but it may be the means of changing your whole life.

Mail the Coupon Today for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 5309-F, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject before which I have marked X in the list below:

BUSINESS TRAINING COURSES

- ☐ Industrial Management
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- ☐ Salesmanship
- ☐ Advertising
- ☐ Business Correspondence
- ☐ Show Card and Sign Lettering
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- ☐ Railroad Positions
- ☐ Gas Engine Operating
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Metallurgy and Mining
- ☐ Steam Engineering
- ☐ Architect
- ☐ Architects' Blueprints
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
- ☐ Concrete Builder
- ☐ Structural Engineer
- ☐ Chemistry ☐ Pharmacy
- ☐ Automobile Work
- ☐ Airplane Engines
- ☐ Agriculture ☐ Navigation
- ☐ Mathematics ☐ Radio

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Street Address.....

City.....State.....

Occupation.....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

MECHANICS *HERE'S YOUR* PLIER

This drop-forged Crescent Plier has a tin nose bent at a 30 degree angle. An extremely efficient tool where hand room is limited. Ideal for pulling cotter pins and general work. Absolutely guaranteed. For sale by hardware and accessory dealers.

60¢ 6 inch

No. J-26

CRESCENT TOOL CO.
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Wrenches Chisels Snips
Pliers Punches Hacksaws
Screw Drivers Auger Bits Nippers
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CRESCENT and Smith & Hemenway TOOLS

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HB One Day Charging starts you making big money recharging auto and radio batteries. $150 to $300 monthly profits easily made. **Only $35 cash brings complete HB One Day Battery Charging Outfit.** Easy payments. No experience needed. Lowest-Priced complete One Day Charging Outfit on the market. **30 days' trial on money back guarantee.**

Write for free bulletin.

HOBART BROS., Box M281, Troy, Ohio

Automotive engineers claim that 95% energy in gasoline is wasted. With the perfection of a new invention part of this waste gas is turned into added mileage and power. Think of the sales possibilities in offering this new Whirlwind invention that saves car owners hundreds of gallons of gas yearly. Amazing reports show up to

40 Miles on a Gallon of Gas

Owners also report more power, quick starting, instant pick up and disappearance of carbon. Men are now being appointed in each locality to take care of the tremendous demand.

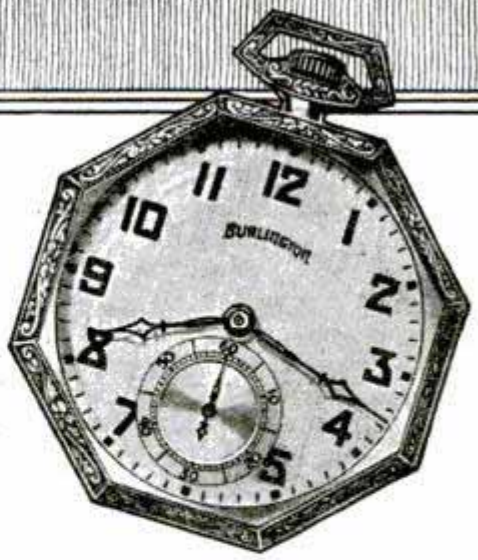
Get Territory Quick

FREE SAMPLE OFFER

A Whirlwind Gas Saver is provided our workers to enable them to equip their own car or carry for demonstration purposes. Send name and address today for this free sample and wonderful money making offer.

Our men can easily make $5000 to $6000 yearly. Spare time workers make $20.00 and even more daily—You too can get this big money.

WHIRLWIND MFG. CO.
999-178 E. Third St.
Milwaukee, - - Wisconsin



New 21 Jewel BURLINGTON

Don't think of buying ANY watch until you see the NEW Burlington Book. It is sent *free*—and shows, in beautiful color plates, the NEW 21 Jewel Burlington in all the latest, most advanced, most exquisite designs. Here is a NEW triumph for the Burlington. Always a masterpiece—*it is now better than ever!* 21 Ruby and Sapphire jewels; adjusted to the Second, to Temperature, to Isochronism, to Positions; 25 Year Gold Strata Case.

$1.00 Down

This masterpiece among watches is sold direct to you, at our rock bottom price, for only $1.00 down, the balance in small, easy monthly payments. **And it is sent on approval.** No obligation to buy unless you are perfectly satisfied. When you can so easily secure a watch that you can absolutely **depend** upon under all conditions, why deprive yourself of this great satisfaction one day longer than necessary?

Mail the coupon below for our free book and liberal offer! Do it NOW! It costs you nothing to FIND OUT!

New Burlington Book *Sent Free!*

Don't fail to get this New Book, containing the most complete and varied assortment of new watch styles and designs ever shown under one cover. In addition to the New Burlington Bulldog, you will find the new Burlington Supreme—the new 18 karat gold Lady Burlington—the new square, strap watches for men—special watches for doctors, nurses, etc., in fact, a watch for EVERYONE!

Mail Coupon Now!

Find out about the great special $1.00 down offer which we are now making for a limited time only. And get the New Burlington Book. It will show you how to judge the real value of a watch and how to avoid purchasing watches that are overpriced. Remember—the book *is free!* Just fill out the coupon and mail it TODAY!

BURLINGTON WATCH COMPANY
Dept. 13-52 19th St. and Marshall Blvd., Chicago
Canadian Address: 118 Princess St., Winnipeg, Man.

Burlington Watch Co., Dept. 13-52
19th St. and Marshall Blvd., Chicago.
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Please send me (without obligation and prepaid) your new free book on watches, with full explanation of your liberal approval offer on the New Burlington Watch.

Print name and address plainly.

Name .....

Address .....

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The Crosley A C Bandbox is the leading radio of today—*because*

At last! The radio tube that needs no batteries! Here it is functioning quietly, smoothly, powerfully in this new Crosley 6 tube receiver—the A C Bandbox.

Now, the Crosley A C Bandbox needs no more attention than you pay the electric lamp that lights your home.

This is what the world has anticipated and many have imitated. Crosley offers it to you at the WORLD'S LOWEST PRICE—$110 without tubes.

Combined with the Crosley facilities for economical manufacture is the patent situation of which Crosley has full advantage. Licensed to manufacture under the patents controlled by the electrical and radio industries, the Crosley Bandbox is a NEW receiver incorporating latest radio developments, the most advanced ideas of radio reception as well as sound reproduction. This outstanding engineering job is best understood when you consider its features are such as are found in radio twice and more its price.

1. Complete shielding of all elements.
2. Absolute balance (genuine Neutrodyne).
3. Volume Control.
4. Acuminators for sharpest tuning.
5. Single cable connections.
6. Single station selector.
7. Illuminated dial.
8. Adaptability to ANY type installation.

The set is solidly mounted on a stout steel chassis. As all controls are assembled together in the front, cabinet panels are easily cut to allow their protrusion. The metal escutcheon is screwed on over the shafts and the installation has all the appearance of being built to order.

Two large furniture manufacturers have designed console cabinets in which the Bandbox can be superbly installed (Showers Bros. Co., of Bloomington, Ind., and the Wolf Mfg. Industries of Kokomo, Ind.). Powel Crosley, Jr., has approved them mechanically and acoustically and has seen to it that the famous Crosley Musicones are built in them so that the best type of loud speaker reproduction may be insured.

The Bandbox is housed in a brown frosted crystalline finished metal case which is easily removed for console installation.

See the new Crosley A C Bandbox at your dealer's NOW! Hear first hand its delightful performance! Enjoy the best in radio at the least cost! Write Dept. 15 if you can't locate a dealer!

ULTRA MUSICONE $9.75

Crosley Musicones are famous for their value. The new type D Musicone is as extraordinary as its companions and promises great satisfaction in its tone, volume and reproduction.

SUPER MUSICONE $12.75

New Type D Musicone $15

CROSLEY RADIO

Crosley is licensed only for Radio Amateur, Experimental and Broadcast Reception.

Montana, Wyoming, Colorado, New Mexico and West, prices slightly higher.

THE CROSLEY RADIO CORPORATION
Powel Crosley, Jr., President
Cincinnati, Ohio

of these wonderful tubes

The amazing new RCA alternating current tubes—the UX 226 and UY 227—utilize for their filaments and their heating regular house lighting current. Current is stepped down through transformers. Rectifiers are NOT used.

the radio patents of these industries

The research and development work of these great industries — The Radio Corporation of America, The General Electric Co., The Westinghouse Co., The American Telephone & Telegraph Co., and The Haseltine and Latour Corporations—are available to Crosley engineers in the constant advancement of Crosley radio design.

and the amazing capacity of this MERSHON *Electrolytic* CONDENSER

This is one of Crosley's great features. It is an exclusive Crosley device. It is self-healing—will last indefinitely—never needs attention and eliminates the danger of blown out paper condensers, which are causing so much trouble in electrically operated sets.

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He Mailed a Coupon Like This

Rhodes Manufacturing Co., Dept. B-372,
1418 Pendleton Ave., St. Louis, Mo.
Without obligating me, please send me illustrated description of KRISS-KROSS Stropper and your offer of a 3-Way Razor FREE.

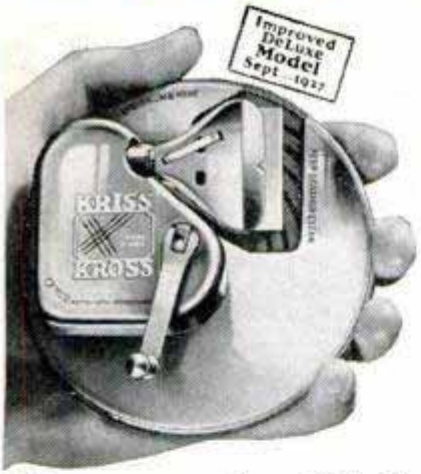
Name.....

Address.....

City.....State.....

( ) Check here if interested in becoming representative.

...and it Brought Him 1129 Cool Shaves from One Single Blade!



Another Triumph for KRISS-KROSS. The Most Amazing Shaving Invention Ever Patented! Mr. T. Liddle, of Illinois, Wrote Recently: "I Have Been Using One of Your Stroppers Since May, 1924. I Shave Every Morning and I am STILL ON MY FIRST BLADE!" Read Astonishing Details. Then Act at Once for Real Shaving Joy.

NO wonder KRISS-KROSS marks such a radical advance in shaving comfort and economy! For now at last it has captured a secret that has baffled scientists for years! It actually reproduces mechanically the diagonal flip-flop master-barber's stroke that gives razor blades the keenest cutting edge that steel can take! Pressure decreases automatically. And in just 11 seconds you are ready for the coolest, slickest shave you ever had!

An Economy—And a Luxury, Too!

KRISS-KROSS not only introduces you to undreamed-of shaving luxury—but cuts shaving costs 83%. It makes your blades last almost indefinitely. Any number of cases are on record where a KRISS-KROSS user reports over 365 keen shaves a year from the same blade! For example, C. S. Stephenson (Oklahoma) writes: "I have been using one blade continuously for one year and nine months and have no idea how much longer it will last."—No wonder there are over a million satisfied users of KRISS-KROSS in America today!

Sharpens Any Make of Razor Blade

KRISS-KROSS works on practically any known make of razor blade, single or double edge (except Durham). Gives excellent results with Gillette, Gem, Valet Auto-Strop, Keen-Kutter, Enders, Ever-Ready, Darwin, Schick, Christy and over 2 dozen others.

Get Free Offer

And now—to introduce this sensational device that makes old blades keener than new—we are giving with it *free* an amazing new kind of razor. Instantly adjustable to any angle. Comes with 5 new-process blades. Find out all about this astonishing introductory offer. No obligation. Just fill out and mail the coupon above today!

RHODES MFG. CO., Dept. B-372

1418 Pendleton Avenue ST. LOUIS, MISSOURI

World's Largest Mfrs. of Mechanical Strappers

AGENTS, $5-$15 AN HOUR!

Make big money with KRISS-KROSS! It is sold only through authorized agents who are making up to $200 a week and, in some cases, even more! All you do is demonstrate and take orders for this unique invention which is heavily advertised but never sold in stores. Nine out of ten men want to own it as soon as they see how it works. R. S. Hopkins (Michigan) made $50 his first day. Spare time workers, factory men, mechanics, etc., often make $6—$12 extra a day just showing KRISS-KROSS to friends and fellow-employes. Generous commissions and bonus. No obligation. Get details and liberal proposition today. Check bottom line of coupon **above** and mail it now!

DO IT NOW

In all the World

THERE IS NO LOUD SPEAKER LIKE THIS

6 FT. 6 IN. OF HORN

Make $50 a Week In Your Spare Time

NO selling experience necessary; no canvassing. No hunting for prospects—every radio owner a prospect. Demonstrate in the home—evenings—your spare time. A brand new up-to-date tried and tested improvement in a loud speaker which added to any radio means a sure sale—the less talking you do the better—a new model Ozarka Loud Speaker will sell itself to any radio owner.

Revolutionizes radio reception as you now know it. Produces the true tone of any radio—the results are amazing. Test alongside of any ordinary loud speaker and let the results talk for themselves. Easy sales—big profits—exclusive territory to proven men.

Sell Radio Loud Speakers

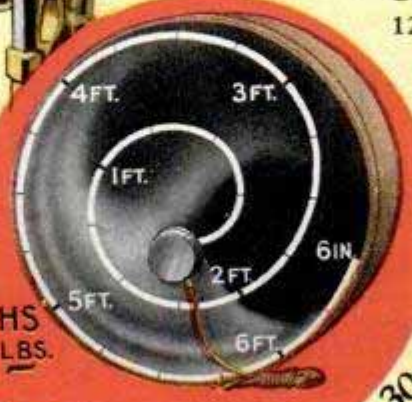
Entirely new principle—6 foot 6 inch horn. No vibration—registers every note perfectly, even the lowest bass. The only loud speaker which reproduces tone accurately. Makes an entirely different and true sounding instrument out of any radio. If you are looking for some extra money here is a sure way to get it—quick and easy. Every sale made means a booster to make more sales. 4810 men are now in the Ozarka organization. There is still some open territory for men who can prove their ability. You'll not only sell them easily yourself but have salesmen working for you.

30 Days' FREE Trial

Territory going fast. Write or wire today for full details regarding our 30 DAY FREE TRIAL OFFER. Try a new Ozarka Loud Speaker on your own radio. When thoroughly convinced of its exceptional merit, sell others. WE TRUST YOU.

OZARKA INC.
122 W. Austin Ave.
CHICAGO, ILL.

THE EXPONENTIAL LOUD SPEAKER



WEIGHS 45 LBS.

Mail This Coupon Today

30 DAYS' FREE TRIAL

Ozarka Inc.
122 W. Austin Av
Chicago, Ill.

Gentlemen: Send m
full details about you
Ozarka Loud Speakers, you
30 day FREE TRIAL OFFE
and how I can make $50.00 week
in spare time.

Name .....

Address .....

City and State .....

Pop. Mech.—Fe